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A THIRD UPDATE OF THE STATUS OF THE 3CR SOURCES: FURTHER NEW REDSHIFTS AND NEW IDENTIFICATIONS OF DISTANT GALAXIES*

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We present the third major update of new optical and radio data for the strong sources in the Revised Third Cambridge Catalogue (hereafter 3CR). New positions, redshifts, magnitudes, and identifications have been included as well as some radio data for the sample of 298 extragalactic 3CR sources. A new and extended bibliography of optical and radio data is included.

The 3CR sources have now reached an almost satisfactory state of optical identification; 91% of the sources at $|b| \geq 10°$ now have firm identifications and we have spectra for most of them. The few remaining faint objects at high latitudes are, of course, important, as they tend to be the most luminous radio sources known. Full completion of the 3CR data will aid in reducing the residual uncertainties at the luminous end of the evolving radio luminosity function.

Finally, we present some new identifications and new spectroscopic data for 29 faint 3CR galaxies, and one quasar.

Key words: radio galaxies—3CR catalog—galactic redshifts

I. Introduction

The previous two 3CR status reviews (Smith, Spinrad, and Smith 1976; Smith and Spinrad 1980) reviewed and tabulated the optical information on the extragalactic 3CR sources, using the optical data assembled with the technology of the 1970s. The recent advent of VLA radio maps and central component positions, and new optical CCD detectors for both imaging and spectroscopy, has rapidly improved our ability to detect, indentify, and obtain redshifts for very faint 3CR candidates. Thus the catalog, even at faint optical levels, is nearing a satisfactory level of completeness.

In this paper we include the old radio positions for most of the unidentified sources from Bennett (1962). Some of these radio positions are quite poor (especially those at low galactic latitudes) and considerable future improvement is needed to bring them up to modern quality; the VLA can do the job.

We added one new source, 3C292, strong enough for 3CR inclusion (cf. Laing, Riley, and Longair 1983, hereafter LRL83). We have retained a few previously included 3CR sources, which turned out, after critical examination of their radio properties, to be resolved doubles or sources weaker than the (old) nominal cutoff of a 9 Jy at 178 MHz. This decision was mainly one of historical continuity, so our sample is "softer" than that of LRL83.

*Based in part on research done at Lick Observatory.

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II. The Identification Content of the Present Listing

The 3CR catalog of 298 extragalactic sources contains the following proportions of safely identified objects:

195 radio galaxies (including the N-Galaxies) (= 65.4%)
53 radio quasars (including the BL-Lac object 3C 66) (=17.8%)

There are twelve identifications which we consider as yet unconfirmed (they are probably also mostly galaxies), and there are 38 sources which are still *unidentified*. Of these last 38, 24 sources lie at $|b| < 10°$, and will be difficult objects until the advent of routine 2μ–5μ IR imaging. We also note that many of the obviously obscured sources also need better, modern radio maps, presumably obtainable with the VLA. Some may have central components, centered precisely on the optical candidates (cf. Laing, Owen, and Puschell 1983, hereafter LOP). The future IR observers can take advantage of the improved positions. The 14 unidentified 3CR sources at higher latitudes should also be systematically remapped with a large dynamic-range radio synthesis system. After that effort, reimaging in the optical with a CCD camera at a good seeing site could push the optical detection limit close to $V = 25$, if necessary. It will be important to check whether these few unidentified, presumably very faint sources, could be distant galaxies with $z \geq 2.0$. If so, they *might* be very red ("old and dead", as far as star formation is concerned) galaxies, following the most passive evolutionary models of Bruzual (1983), as suggested for 3C437 and 3C470 by Lilly (1983) and Lilly and Longair (1985). If that scenario is correct, their detection will actually be easier at 2μ or 3μ in the near-IR, than in the visual-red regime.

The present attention of faint galaxy observers in the remaining powerful 3CR sources has lead to numerous

new identifications, and a good redshift success rate, since most of the strong radio galaxies show moderate/strong emission lines (Spinrad and Djorgovski 1984*a*,*b*; Perryman et al. 1984). The 23 unconfirmed and/or unidentified high-latitude sources comprise only 9% of the total extragalactic sample at $|b| \geq 10°$; 91% have now been well identified and most have optical spectra, although a few faint objects have defied our attempted redshift measurements (e.g., 3C322, $V \approx 23.5$; no obvious emission lines).

In the 3CR listing (section VI of this paper), we note that the 20 most-distant sources tabulated ($1.2 \leq z \leq 2.01$) are a mixture of quasars and radio galaxies, with $\langle z \rangle_{\rm med} = 1.5$ and $S_{178} \approx 13$ Jy. They are extremely powerful radio sources with $P_{178} > 10^{27}$ WHz^{-1} sr^{-1}, among the most luminous sources in the radio region. They share the general cosmic evolution of QSOs, with a $(V/V_{\rm max})$ ratio $\simeq 0.67$ (LRL83). 3C256 (Spinrad and Djorgovski 1984*b*) still has the highest galaxy redshift, $z = 1.819$, although several fainter galaxies (3C65, 3C241) have been observed and had smaller redshifts. Windhorst (1984) has speculated that there might be a redshift limit of about 2 on radio galaxies of high flux density (3CR class).

Looking at the distribution sorted by radio flux density at 178 MHz (S_{178}), we find that the *brightest* 20 identified sources (working down from Cygnus A) have $S_{178} \sim 100$ Jy and a median redshift, $\langle z \rangle_{\rm med} \simeq 0.07$, with a large dispersion. The *weakest* 20 identified sources, with $S_{178} \simeq 8$ Jy show $\langle z \rangle_{\rm med} \simeq 0.32$, significantly larger than 0.07; this is the sense of the difference anticipated for a set of objects with a small dispersion in M_v (optically standard candles) for the gE galaxies which represent a majority of the 3CR identifications (Sandage 1972). Figure 1 shows the present redshift distributions for the 3CR sample. The median redshift for all the radio galaxies (excluding the N galaxies) is 0.2145, and for the mix of QSOs, N galaxies, and BL Lacertae objects, it is 0.691.

We confirm another statistical distinction, long known in general, that the source spectral index, (column (7) in the listing) is steeper ($\alpha = 0.95$) for the most luminous radio galaxies ($\langle z \rangle \simeq 1.4$) than it is for the weaker 3CR galaxies at $\langle z \rangle \simeq 0.03$ ($\alpha = 0.72$). Figure 2 shows the radio spectral index as a function of redshift for the sample of 3CR radio-galaxies (excluding the N-galaxies). A slight increasing trend may be caused by the radio-equivalent of the K-correction—the radio spectra tend to be curved. Another possibility is that there is some evolution of the properties of radio-sources with redshift.

Completion of the whole 3CR data set is an appealing and approaching goal; complete information on the brightest radio sources will solidly constrain the cosmic epoch of the evolution of the most powerful end of the extragalactic radio source luminosity function (cf. Peacock 1985; Wall and Peacock 1984; Condon 1984).

III. Some Individual Radio Galaxies of Note

We present here direct images and identifications for two faint and distant radio galaxies. They are 3C297 (Fig. 3) (initially identified by Browne, private communication; which we confirm), and 3C305.1 (Fig. 4), identified by H. E. Smith and E. M. Burbidge. Neither galaxy received much attention before 1984. These two radio galaxies do not have modern radio maps, but we feel their identifications to be secure, partly because they are spectroscopically extreme cases of AGN.

The 3C297 image is a gray-scale representation of a portion of a Kitt Peak CCD frame, obtained in mediocre seeing on 1984 April 2 UT by two of us (H.S., S.D.). The detector was an 800 × 800 TI chip, at the prime focus of the Mayall 4-m telescope.

3C297 may be designated as an N-type galaxy, as its

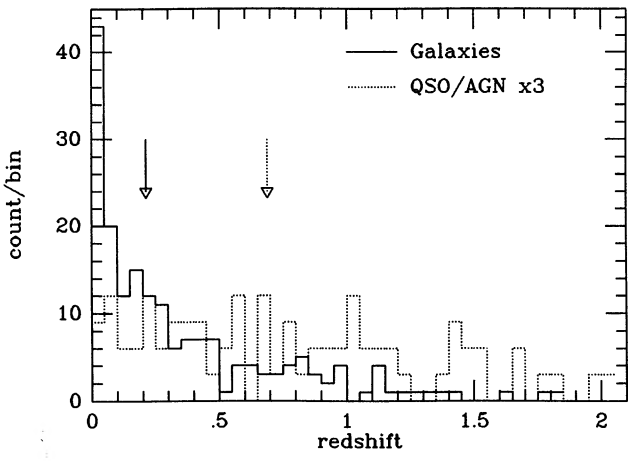

FIG. 1—Redshift distributions for the 3CR sources observed spectroscopically. The solid line corresponds to the radio-galaxies (excluding the N-galaxies), and the dotted line to the QSOs, N-galaxies, and BL Lac objects. The bin counts for the latter group were multiplied by 3 for clarity. The arrows mark the sample medians.

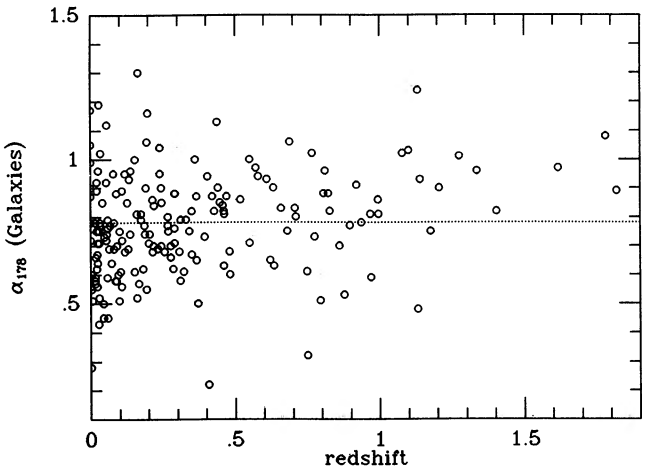

FIG. 2—Radio spectral index as a function of redshift for the 3CR radio-galaxies (excluding the N-galaxies). The dotted line represents the sample median.

nucleus is well defined, despite the degraded seeing during the exposure—its radial profile shows a definite core-halo structure.

Spectroscopy of 3C297, obtained at Kitt Peak with the Cryogenic Camera yielded an emission-line redshift of $z = 1.406$; this is, of course, one of the largest measured for a radio galaxy. This N-galaxy shows an emission spectrum with moderately strong high-ionization emission lines.

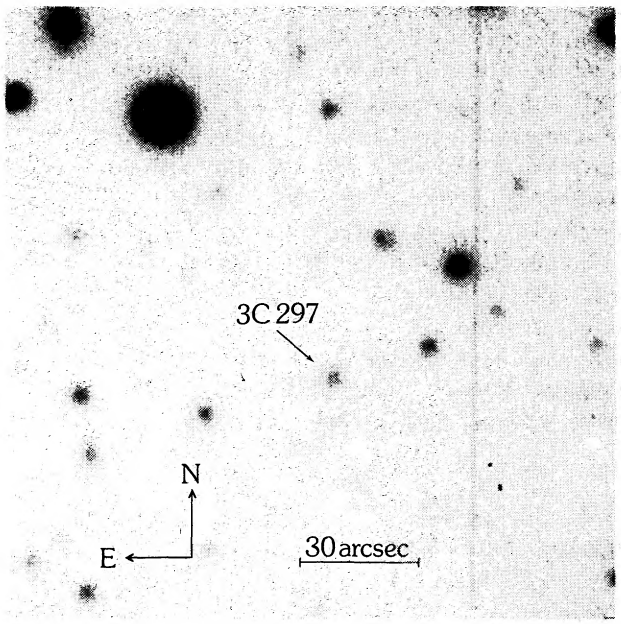

FIG. 3—A grey-scale representation of a portion of a Kitt Peak 4-m CCD frame of 3C297 (R-band), obtained in mediocre seeing on 1984 April 2 UT. 3C297 is the faint N-galaxy image marked with an arrow.

3C305.1 was photographed by Dr. Smith at the Kitt Peak 4-m reflector prime focus with a baked (red-sensitive) IIIa-F/GG-495 emulsion-filter combination. A portion of his plate is reproduced here (Fig. 4); the radio galaxy image appears asymmetric, and a deeper CCD frame would be desirable to check on possible appendages to this distant radio galaxy.

The 3C305.1 spectrum was observed in April and May 1984; we used the new CCD spectrograph developed by J. S. Miller and L. Robinson on the Shane 3-m reflector for the Lick spectra, while the higher S/N ratio Kitt Peak spectrogram (see Fig. 3) was obtained with the Cryogenic Camera on the Mayall 4-m reflector. The visual-red spectrum of 3C305.1 (Fig. 5) shows an enormously strong [O II] λ3727, strong C II] λ2326, and moderate Mg II λ2799 emission. These lines are typical for low-ionization, powerful radio galaxies (Spinrad and Djorgovski 1985). The redshift measured for 3C305.1 is $z = 1.132$.

IV. 26 Additional Galaxy/QSO Redshifts

Over the last few years, Spinrad and Djorgovski have obtained redshifts for many 3CR candidates, and some of them have not yet been published. We list in Table I 29 new and/or confirming redshifts for 3CR galaxies, and one

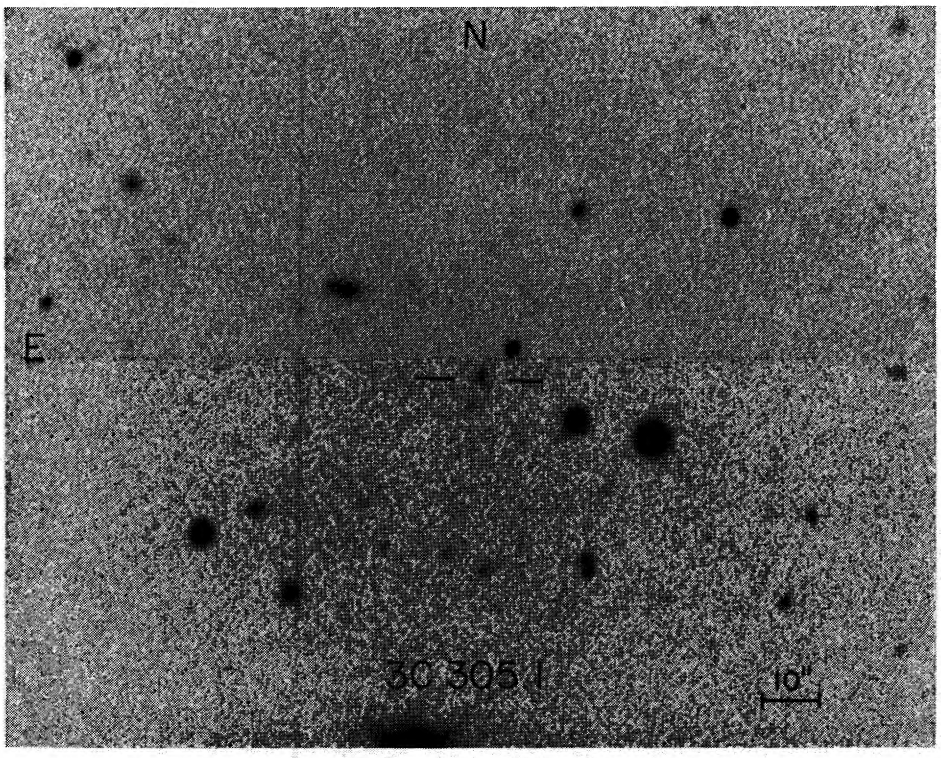

FIG. 4—A portion of a red (IIIa-F) plate showing 3C305.1, a radio galaxy at $z = 1.132$. The original plate was obtained at the 4-m Mayall reflector by Dr. H. E. Smith.

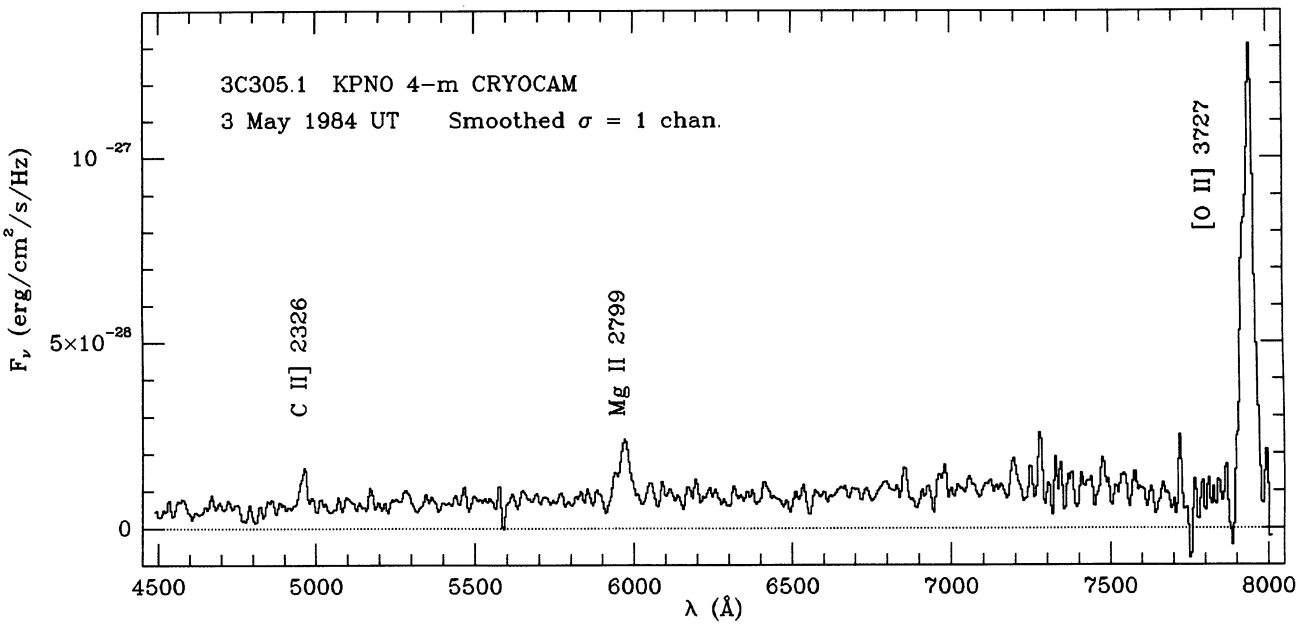

FIG. 5—The low-resolution spectrum of 3C305.1, obtained by Spinrad and Djorgovski at Kitt Peak with the Cryogenic camera. Note the enormous [OII] $\lambda_0$3727 emission and the moderate (low-ionization) emission lines due to MgII λ2799 and CII] λ2326, at $z_e = 1.132$ for this faint radio galaxy.

TABLE I

New Redshifts for 30 3CR Objects

3CR#	Morph. Type	z	Spectral Notes	Other Remarks
34	Gal.	0.6897	strong [OII], wk. [NeIII] em.	--
43	QSO:	1.47	mod. MgII, [NeIV], CII] em.	Q? z sl. uncertain
44	Gal.	0.66	strong [OII], [OIII] em.	Cluster!
49	Gal.	0.6207	strong [OII], mod. [NeIII] em.	--
52	Gal.	0.285	abs. only.	Pair, equal z.
54	Gal.	0.8274	strong [OIII], mod. [OII] em.	Cluster?
61.1	Gal.	0.186	mod. [OIII] em.	cl., obj. 'b'.
65	Gal.	1.176	mod. [OII], [NeIV], MgII em.	v. faint
103	Gal.	0.33	strong [OII] em.	--
165	Gal.	0.29	mod. [OII] em; abs.	--
172	Gal.	0.5191	strong [OIII], mod. Hβ em.	on central source, LOP
175.1	Gal.	0.920	mod. [OII] em.	--
180	Gal.	0.22	strong [OIII] em.	--
208.1	N-Gal?	1.02	mod. MgII, [NeIV] em.	Compact.
220.1	Gal.	0.61	strong [OII] em.	--
220.3	Gal.	0.685	strong [OII], [NeV] em.	cD?
225B	Gal.	0.58	mod. [OII], wk. [NeIII] em.	--
226	Gal.	0.82	strong [OII], mod. [NeIII] em.	--
239	Gal.	1.781	strong [NeIV], CIV, HeII, Lyα	Blue spectra also
247	Gal.	0.7489	strong [OII], wk. [NeIII] em.	Group (?)
263.1	Gal.	0.366	wk. [OII] em., abs.	Faint for z, ID ok?
268.1	Gal?	0.97	strong [OII] em.	Not imaged. LOP cen.comp.
277.2	Gal.	0.766	strong [OII] em.	Group.
280	Gal.	0.996	strong [OII], mod. [NeIII] em.	--
292	Gal.	0.71	mod. [OII], [NeIII] em.	--
297	N-Gal.	1.4061	mod. MgII, [NeIV], CIII]	see Fig. 1 here
305.1	Gal.	1.132	strong [OII],mod.[CII],MgIIem.	see Fig. 2 here
325	N-Gal.	0.86	mod.(broad) MgII, wk. [OII] em.	Compact.
327.1	Gal.	0.4628	strong [OIII] em.	--
337	Gal.	0.635	mod. [OII], [NeV] em.	Cluster. r.s.=gal b., but specific ID slightly uncertain

quasar. Spectroscopic measures like these make for real progress in physical understanding of the radio sources; they are an important part of this paper.

V. Sources with Positional Disagreements or Particular Problems

Several of our unidentified or uncertain 3CR sources

have unusual problems; 3C294 is apparently obscured by a galactic star right on the LRL83 position; the optical candidate for 3C225A is about 3″ from the radio sources and this (19.5?) faint galaxy may *not* be the correct identification; (Riley private communication); 3C250 is some 3″ off the wide lobes radio axis and is thus a less secure identification than desired (Gunn et al. 1981), and 3C194 has a substantial positional offset from the radio position, despite its reasonable optical luminosity (for a radio galaxy at $z = 0.31$).

Also, since the last edition, a few redshifts have been revised; the most important recent change is the "demise" of 3C427.1 (Spinrad 1985) to $z = 0.572$. In a catalog of this size some minor problems are inevitable, and its unlikely that all the discrepancies will be easily removed in the next years. These problem sources are, fortunately, only a minor headache to us now.

VI. The 3CR Listings

Our computer listing is broken into five sections, as before (Smith and Spinrad 1980), with two reference listings. The senior author intends to continue his update of the 3CR data, so contributed future new data on these sources will be gratefully incorporated and privately circulated, as circumstances dictate.

We wish to acknowledge considerable help from many interested astronomers; in particular we thank Drs. S. Lilly, J. Riley, R. Laing, F. Owen, Wil van Breugel, S. Wyckoff, M. Wagner, J. Stocke, I. Browne, and especially H. E. Smith for advice and unpublished data of all sorts. We also thank Doug Baker and Mike Strauss for help with the data reduction.

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REFERENCES

Bennett, A. S. 1962, *Mem. R.A.S.* **68**, 163.
Bruzual, G. 1983, *Ap. J.* **273**, 105.
Condon, J. J. 1984, *Ap. J.* **284**, 44.
Gunn, J. E., Hoessel, J. G., Westphal, J. A., Perryman, M. A. C., and Longair, M. S. 1981, *M.N.R.A.S.* **194**, 111.
Laing, R. A., Owen, E., and Puschell, J. 1983 (unpublished preprint). (LOP)
Laing, R. A., Riley, J. M., and Longair, M. S. 1983, *M.N.R.A.S.* **204**, 151. (LRL83)
Lilly, S. 1983, Ph. D. Thesis, University of Edinburgh.
Lilly, S., and Longair, M. S. 1984, *M.N.R.A.S.* **211**, 833.
Peacock, J. 1985, *M.N.R.A.S.* (in press).
Perryman, M. A. C. Lilly, S. J., Longair, M. S., and Downes, A. J. B. 1984, *M.N.R.A.S.* **209**, 159.
Sandage, A. R. 1974, *Ap. J.* **178**, 25.
Smith, H. E., and Spinrad, H. 1980, *Pub. A.S.P.* **92**, 553.
Smith, H. E., Spinrad, H., and Smith, E. O. 1976, *Pub. A.S.P.* **88**, 621.
Spinrad, H. 1985, *Ap. J.* (in press).
Spinrad, H., and Djorgovski, S. 1984*a*, *Ap. J. (Letters)* **280, L9.**
Spinrad, H., and Djorgovski, S. 1984b, *Ap. J. (Letters)* **285, L49.**
Spinrad, H., and Djorgovski, S. 1985, *Ap. J.* (in preparation).
Wall, J., and Peacock, J. 1985, *M.N.R.A.S.* **216**, 173.
Windhorst, R. 1984, Ph.D. Thesis, Leiden University.

Note added in press: As this issue goes to print, we note that 3C410 may now be unequivocably identified with a galaxy; its redshift is $z = 0.248$.

THE REVISED THIRD CAMBRIDGE CATALOG OF RADIO SOURCES

I. COMPLETE LISTING OF EXTRAGALACTIC SOURCES

3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
2.0	00 03 48.84	-00 21 06.0	19.35*	1.037	14.9	0.67	-61	47	48	90		QSO
6.1	00 13 34.48	79 00 10.4	22.	0.840	13.7 C-	0.80	17	37	147	11	SE	GAL
9.0	00 17 49.83	15 24 16.5	18.21	2.012	17.8	1.09	-47	53	54	11	OKE(159), SED	QSO
11.1	00 27 06.	63 24 00.			12.4	0.58	1			16	OBSCURED	
13.0	00 31 33.17	39 07 41.8	22.5	1.351	12.0	0.93	-23	148	148	9	SE; ID(157)OUT	GAL
14.0	00 33 29.30	18 21 28.4	20.	1.469	10.4 C-	0.81	-44	18	155	16	8,19ID,RED Q?	QSO
14.1	00 33 36.	59 30 00.			16.1 C-	0.80	-3			127	OBSCURED	
15.0	00 34 30.56	-01 25 37.8	15.34	0.0730	15.8 C-	0.64	-64	92	93	91	WE	GAL
16.0	00 35 09.16	13 03 39.6	21.	0.405	11.2	0.94	-50	170	150	90	WE	GAL
17.0	00 35 47.18	-02 24 09.5	18.02	0.2197	20.0	0.52	-65	18	67	121	SE	N
18.0	00 38 14.57	09 46 56.1	18.5	0.188	19.0	0.74	-53	18	156	16	SE	GAL
19.0	00 38 13.76	32 53 39.9	20.	0.482	12.1 C-	0.60	-30	8	129	90	*CL	GAL
20.0	00 40 20.00	51 47 08.1	19.	0.350	42.9	0.67	-11	27		15		GAL
21.1	00 42 30.	67 48 00.			9.0		5			126	OBSCURED	
22.0	00 48 04.73	50 55 44.8	22.	0.937	12.1 C-	0.78	-12	170	155	15	SE	GAL
27.0	00 52 42.	68 13 00.			26.5 C-	0.61	6			106	OBSCURED	
28.0	00 53 09.12	26 08 23.4	17.64	0.1952	16.3	1.06	-37	18	67	3	E,CL,175,R	GAL
29.0	00 55 01.57	-01 39 39.4	14.07	0.0447	15.1	0.50	-64	18	94	128	78ID,ABS,CL	GAL
31.0	01 04 39.18	32 08 44.3	12.14	0.0167	16.8	0.57	-30	18	31	9	N382/3,ABS,CL	GAL
33.0	01 06 14.94	13 04 26.4	15.19	0.0595	54.4	0.76	-49	68	67	160	73ID,SE	GAL
33.1	01 06 06.48	72 55 59.2	19.5	0.181	13.0 C-	0.62	10	37	35	9	PAIR	GAL
33.2	01 06 54.	69 06 00.			5.5	0.90	7			126	OBSCURED	
34.0	01 07 32.58	31 31 22.5	21.	0.689	11.9	1.06	-31	170	164	9	SE,IDI54	GAL
35.0	01 09 04.14	49 12 40.1	15.6	0.0670	10.5	0.77	-13	18	4	10	WE	GAL
36.0	01 15 03.22	45 20 42.4	20.		8.2	0.85	-17	8		5		*QSO
40.0	01 23 26.00	-01 36 20.0	12.28	0.0177	26.0	0.66	-63	74	97	68	N545/7,ABS,CL	GAL
41.0	01 23 54.73	32 57 37.7	21.	0.794	10.6	0.51	-29			10		GAL
42.0	01 25 42.67	28 47 30.4	20.	0.395	12.0 C-	0.73	-33	19	156	10	8,37ID,SE	GAL
43.0	01 27 15.04	23 22 51.5	20.	1.47	11.6	0.75	-39	47	150	90		QSO
44.0	01 28 47.7	06 15 36.	R21.	0.66	7.9	0.83	-55	150	150	10	10*G CL,SE	GAL
46.0	01 32 34.09	37 38 47.0	19.5	0.4373	10.2	1.13	-24	18	156	9	37ID,*CL,SE	GAL
47.0	01 33 40.42	20 42 10.6	18.10*	0.425	26.4	0.98	-41	55	55	11	96FC	QSO
48.0	01 34 49.82	32 54 20.4	16.2 *	0.367	55.0 SC	0.59	-29	56	57	112	OKE(159),SED	QSO
49.0	01 38 28.41	13 38 19.9	21.	0.621	10.3 C-	0.65	-47	19	150	90	8,37ID,SE	GAL
52.0	01 45 14.5	53 17 47.	18.5	0.2854	13.5 C-	0.62	-8	18	150	118	CL,ABS,R=173	GAL
54.0	01 52 26.55	43 31 19.	22.	0.8274	8.8	0.82	-18	8	150	9	37ID	GAL
55.0	01 54 19.50	28 37 04.8	20.8	0.240	21.5	1.04	-32	37	156	9	WE,SE	GAL
61.1	02 10 37.1	86 05 18.5	19.0	0.186	31.2 C-	0.77	24	33	33	160	GAL B	GAL
63.0	02 18 21.90	-02 10 33.	18.5	0.175	19.2	0.79	-57	18	156	16	12,140ID,SE	GAL
65.0	02 20 37.24	39 47 17.1	23.	1.176	15.2 C-	0.75	-20	154	150	10	8,37 WE	GAL

THE REVISED THIRD CAMBRIDGE CATALOG OF RADIO SOURCES

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3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
66.0	02 19 30.03	42 48 29.9	15.21		8.0	0.62	-17	43		60	LINELESS	BLO
66.0	02 20 01.78	42 45 54.6	12.90	0.0215	24.6	0.62	-17	97	97	60	ABS, CL	GAL
67.0	02 21 18.05	27 36 37.4	18.0	0.3102	10.0 C-	0.58	-31	18	35	11	139, 37ID	GAL
68.1	02 29 27.24	34 10 34.1	19.5	1.238	12.8	0.80	-24	37	105	10	153Z	QSO
68.2	02 31 24.84	31 21 11.2	R24.		10.0 C-	1.05	-26	158		11	8, 37, 6EF	GAL
69.0	02 34 18.5	58 58 51.	R		20.9 C-	0.90	-1			11	OBSCURD. R=173	
71.0	02 40 07.04	-0 13 34.3	8.91	0.0034	16.1 C-	0.55	-52	32	31	90	N1068, SE	GAL
75.0	02 55 05.10	05 50 44.0	13.62	0.0240	25.8	0.71	-45	68	97	113	78ID, ABS, CL	GAL
76.1	03 00 27.28	16 14 36.1	14.86	0.0324	12.2	0.77	-36	18	93	9	142, 139ID, ABS	GAL
78.0	03 05 49.05	03 55 13.1	12.84	0.0288	17.8	0.43	-45	68	67	90	75ID, N1218, WE	GAL
79.0	03 07 11.48	16 54 36.9	18.50	0.2559	30.5 C-	0.92	-35	18	67	9	12ID, SE, *CL	N
83.1	03 14 57.	41 40 33.4	12.5	0.0255	26.0	0.64	-13	25	89	36	N1265, CL	GAL
84.0	03 16 29.55	41 19 51.9	11.85	0.0172	61.3 CX	0.78	-13	30	31	38	N1275, PERA, CL	GAL
86.0	03 23 31.2	55 08 24.			29.0	0.64	-1			11		
88.0	03 25 18.90	02 23 22.0	13.95	0.0302	15.3	0.52	-42	18	67	113	25ID, E,	GAL
89.0	03 31 43.37	-01 21 26.3	16.	0.1386	20.2	0.96	-43	18	156	24	12ID, ABS, CL	GAL
91.0	03 34 02.96	50 35 55.7	18.		14.1 C-	0.72	-4	161		16	OBSCURED	*GAL
93.0	03 40 51.54	04 48 21.7	18.09	0.358	14.4 C-	0.82	-38	59	171	16	MOD EM	QSO
93.1	03 45 35.80	33 44 05.9	19.0	0.244	9.9 C-	0.70	-16	18	156	90	37ID, SE, CL	GAL
98.0	03 56 10.49	10 17 16.4	14.45	0.0306	47.2	0.78	-31	68	67	15	77ID, SE	GAL
99.0	03 58 33.28	00 28 10.6	19.1	0.426	10.8 CX	1.05	-37	8	46	29	SE, *CL	N
103.0	04 04 34.73	42 52 36.3	19.	0.33	26.6 C-	0.79	-7	161	150	9	9*G, R=173, SE	GAL
105.0	04 04 48.07	03 34 27.2	18.5	0.089	17.8	0.58	-34	6	156	113	SE	GAL
107.0	04 09 55.	-01 01 00.			10.8 C-	1.02	-35			24	8*G, M=21	
109.0	04 10 54.85	11 04 39.5	17.88*	0.3056	21.6	0.85	-28	18	93	3	12ID, SE	N
111.0	04 15 01.	37 54 20.	18.0	0.0485	64.6 +	0.73	-9	37	35	123	SE, R=173	GAL
114.0	04 17 27.85	17 46 39.1	22.		6.5	0.89	-22	8		9	37ID	*GAL
119.0	04 29 07.86	41 32 09.5	20.	0.408	15.7	0.22	-4	47	129	71	72ID	GAL
123.0	04 33 55.21	29 34 12.6	21.7	0.218	189.0	0.70	-12	37	163	11	18, 12ID, E, CL	GAL
124.0	04 39 24.	01 38 00.			10.3	1.18	-28			29	8EF	
125.0	04 42 50.	39 37 00.			14.1	0.95	-4			16	OBSCURED	
129.0	04 45 21.2	44 56 45.	19.	0.021	46.9	0.92	0	18	52	36	ABS	GAL
129.1	04 46 29.9	44 58 14.	19.	0.022	10.5	0.89	0	58	52	36	ABS	GAL
130.0	04 48 56.9	51 59 56.	16.5	0.109	15.5	0.89	5	18	156	106	ABS	GAL
131.0	04 50 09.8	31 22 54.			14.6	0.79	-8			16	OBSCURED	
132.0	04 53 42.05	22 44 43.4	18.5	0.214	13.7	0.68	-13	18	156	15	E, CL	GAL
133.0	04 59 54.27	25 12 12.1	20.	0.2775	22.3	0.70	-10	169	156	10	OBSCURED, SE	GAL
134.0	05 01 17.73	38 02 06.1	20.		74.4	0.99	-2	161		161	OBSCRD. R=173	*GAL
135.0	05 11 33.78	00 53 07.9	17.05	0.1273	17.3	0.92	-21	18	94	113	142ID, SE, CL	N
136.1	05 12 58.90	24 55 07.4	17.	0.064	14.0	0.69	-8	18	999	126	SE, R=173	GAL

THE REVISED THIRD CAMBRIDGE CATALOG OF RADIO SOURCES

I. COMPLETE LISTING OF EXTRAGALACTIC SOURCES

3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
137.0	05 15 38.1	50 52 36.			12.5	0.93	8			106	OBSCURED	
138.0	05 18 16.52	16 35 26.9	17.9	0.759	22.2 SC	-.46	-11	47	61	122	62Z	QSO
139.2	05 21 19.1	28 11 00.			11.9	0.96	-4			106	OBSCRD. R=173	
141.0	05 23 26.3	32 47 00.			14.9 C-	0.88	-1			16	OBSCURED	
142.1	05 28 48.9	06 29 54.			19.4	0.86	-15			16	OBSCURED	
147.0	05 38 43.51	49 49 42.8	16.9 *	0.545	60.5 SC	-.46	10	55	55	122		QSO
152.0	06 01 30.9	20 21 24.			12.4 C-	0.88	-1			29	8EF	
153.0	06 05 44.46	48 04 49.0	18.5	0.2769	15.3 C-	0.66	13	18	4	11	12ID, SE, CL	GAL
154.0	06 10 43.75	26 05 30.	18.0	0.5804	23.1	0.77	4	3	42	3		QSO
158.0	06 18 50.	14 31 00.			18.1	1.09	0			90	OBSCURED	
165.0	06 40 04.60	23 22 01.2	19.5	0.29	13.5 C-	0.71	9	161	150	113	R=173; ABS, WE	GAL
166.0	06 42 24.73	21 25 02.8	19.5	0.245	14.7 +	0.90	8	18	156	5	MOD EM, R=173	GAL
169.1	06 47 35.5	45 13 01.	20.5	0.633	7.3	0.90	19	152	156	10	SE	GAL
171.0	06 51 11.05	54 12 50.0	18.89	0.2384	19.5	0.87	22	18	67	11	77ID, SE	N
172.0	06 59 04.13	25 18 15.4	20.5	0.5191	15.1 C-	0.86	13	151	150	125	8EF, SE	GAL
173.0	06 58 56.67	38 01 46.1	21.3		8.7 C-	0.72	18	19		90		*QSO
173.1	07 02 47.91	74 54 16.6	18.9	0.292	15.4 C-	0.88	27	18	999	9	ABS, CL	GAL
175.0	07 10 15.38	11 51 24.0	16.6	0.768	17.6	0.98	10	18	48	10		QSO
175.1	07 11 14.36	14 41 35.0	21.5	0.920	11.4 C-	0.91	12	154	164	16	DE SE	GAL
180.0	07 24 33.27	-01 58 24.4	19.	0.22	15.1	0.84	7	18	177	113	140ID, SE	GAL
181.0	07 25 20.22	14 43 46.6	18.92*	1.382	14.5	1.00	15	47	63	11		QSO
184.0	07 33 59.01	70 30 01.1	21.5	0.994	13.2 C-	0.86	30	154	168	106	STRONG E; Z164	GAL
184.1	07 34 25.05	80 33 24.1	17.	0.1182	13.0 C-	0.68	29	18	4	3	35Z, SE, CL	GAL
186.0	07 40 56.82	38 00 31.0	17.6	1.063	14.1	1.15	26	47	61	3	175, R	QSO
187.0	07 42 27.94	02 07 44.6	19.5	0.350	8.1	0.82	13	18	156	113	ABS	GAL
190.0	07 58 45.04	14 23 04.9	20.	1.197	15.0	0.93	22	18	171	90	19 ID, 169 ID	QSO
191.0	08 02 03.76	10 23 57.6	18.65*	1.956	13.0	0.98	21	47	99	71	64ABS	QSO
192.0	08 02 32.31	24 18 54.9	15.46	0.0598	21.1	0.79	26	18	26	118	12ID, 4Z, SE, CL	GAL
194.0	08 06 37.88	42 36 56.0	20.	0.312	9.9 C-	0.79	32	19	156	11	8ID, ABS	*GAL
196.0	08 09 59.42	48 22 07.2	17.60*	0.871	68.2 C-	0.79	33	56	61	11		QSO
196.1	08 12 57.32	-02 59 13.9	17.5	0.198	18.6	1.16	17	18	156	41	140ID, SE	GAL
197.1	08 18 00.86	47 12 11.0	16.5	0.1301	8.1	0.69	35	18	103	3	ABS, CL	GAL
198.0	08 19 52.33	06 06 47.0	16.78	0.0815	9.7 C-	0.69	23	18	67	113	68ID, SE, CL	GAL
200.0	08 24 21.43	29 28 42.2	20.	0.458	11.3	0.84	33	18	156	5	139ID, WE	GAL
204.0	08 33 18.03	65 24 04.4	18.21	1.112	10.5	1.08	36	47	63	11		QSO
205.0	08 35 10.02	58 04 51.4	17.62	1.534	12.6	0.88	37	18	65	11	ABS	QSO
207.0	08 38 01.73	13 23 05.4	18.15	0.684	13.6 +	0.90	30	47	48	11		QSO
208.0	08 50 22.70	14 04 16.9	17.42	1.110	16.8 C-	0.96	33	59	66	90	63Z=1.112	QSO
208.1	08 51 53.28	14 17 19.5	20.	1.02	8.1 C-	0.65	34	19	150	90		N
210.0	08 55 10.8	28 02 32.7	22.		9.5 C-	0.78	39	39		5	ID=150	GAL

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3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
212.0	08 55 55.62	14 21 24.2	19.06	1.049	15.1 C-	0.92	35	18	171	15	92ID, REDQ.	QSO
213.1	08 58 05.15	29 13 34.5	19.	0.194	6.6	0.55	40	18	156	5	SE, CL	GAL
215.0	09 03 44.15	16 58 15.7	18.27	0.411	11.4	1.06	37	47	61	11		QSO
216.0	09 06 17.26	43 05 59.0	18.48*	0.67	20.2 +	0.84	43	53	171	90		QSO
217.0	09 05 41.10	38 00 30.6	22.	0.8975	11.3 C-	0.77	43	169	148	10		GAL
219.0	09 17 50.70	45 51 44.2	17.22	0.1744	41.2 C-	0.81	45	68	67	15	76ID, SE, CL	GAL
220.1	09 26 31.87	79 19 45.4	20.5	0.61	15.8 C-	0.93	33	169	150	9	18X, SE	GAL
220.2	09 27 29.93	36 14 37.0	19.	1.157	7.2 C-	0.61	47	18	21	90		QSO
220.3	09 31 11.06	83 28 54.9	20.5	0.68	15.7 C-	0.75	31	154	150	5	SE	GAL
222.0	09 33 55.	04 36 00.	23.		11.3 C-	1.17	38	150		71		*GAL
223.0	09 36 50.86	36 07 34.7	17.10	0.1368	14.7	0.74	49	18	26	3	12ID, SE, CL	GAL
223.1	09 38 18.8	39 58 22.	16.36	0.1075	6.0	0.56	49	18	26	3	SE	GAL
225.0B	09 39 32.4	13 59 29.	19.	0.58	21.3 C-	0.94	44	8	150	125	MOD EM, ID 169	GAL
225.0A	09 39 25.17	14 05 35.9	R19.	0.134	7.6	0.93	44	8	177	125	ID? 161, 162	*GAL
226.0	09 41 36.2	10 00 05.1	19.5	0.823	15.0 C-	0.88	43	18	150	10	139ID, SE	GAL
227.0	09 45 07.80	07 39 09.0	16.33	0.0861	30.4	0.67	42	18	94	113	25ID, SE	N
228.0	09 47 27.72	14 34 02.9	21.	0.5524	21.8	1.00	46	169	150	10	8EF, SE	GAL
230.0	09 49 25.12	00 12 36.8	R		21.1	0.82	39			71	72ID=*(153)	
231.0	09 51 42.7	69 55 03.	8.39	0.0009	14.6 C-	0.28	40	100	31	124	M82, E	GAL
234.0	09 58 57.38	29 01 37.4	17.27	0.1848	31.4 C-	0.86	53	25	67	3	77ID, SE, R=173	N
236.0	10 03 05.39	35 08 48.0	15.97	0.0989	14.4	0.51	54	18	94	11	E	GAL
237.0	10 05 22.04	07 44 58.6	R21.	0.877	20.9 C-	0.53	47	178	178	90	RADIO 172	GAL
238.0	10 08 23.1	06 39 26.5	22.5	1.405	16.6 C-	0.82	47	6	148	90	MODEM.	GAL
239.0	10 08 38.97	46 43 08.4	22.5	1.781	13.2 C-	1.08	53	154	177	11	REF=180, UV SP	GAL
241.0	10 19 09.44	22 14 40.7	23.5	1.617	11.6 C-	0.97	56	154	148	29	8EF, WE	GAL
244.1	10 30 19.61	58 30 04.3	19.	0.428	20.3 C-	0.82	51	18	156	173	12ID, CL, SE	GAL
245.0	10 40 06.02	12 19 15.1	17.25	1.029	14.4	0.78	56	53	54	90	87Z	QSO
247.0	10 56 08.35	43 17 29.5	21.5	0.7489	10.6 C-	0.61	62	169	150	10	8EF, MOD EM	GAL
249.0	10 59 37.	-01 00 00.			16.9 C-	0.89	51			16	8EF	
249.1	11 00 27.42	77 15 08.7	15.72*	0.311	10.7	0.81	38	47	63	11	86Z, 12ID, 159S	QSO
250.0	11 06 11.31	25 17 18.3	23.		8.8 C-	0.90	67	154		9	8EF, ID 169	*GAL
252.0	11 08 48.84	35 56 59.8	22.	1.10	11.0	1.03	67	169	148	9	9*BSO, M=19; SE	GAL
254.0	11 11 53.35	40 53 42.0	17.98	0.734	19.9 C-	0.96	66	107	54	11		QSO
255.0	11 17 02	-02 31 00.			12.5 C-	0.87	53			91	8EF	
256.0	11 18 04.15	23 44 21.2	21.5	1.819	9.3	0.89	69	72	148	71	SE	GAL
257.0	11 20 43.	05 52 00.			9.7	0.84	60			121		
258.0	11 22 06.42	19 35 58.8	19.5	0.165	9.7 +	1.30	69	18	156	27	E, CL; MOD EM	GAL
263.0	11 37 08.97	66 04 26.9	16.32	0.6563	15.2	0.82	50	47	86	11		QSO
263.1	11 40 49.21	22 23 35.0	20.	0.366	18.2 C-	0.87	74	8	150	90	ID 169; WE	GAL
264.0	11 42 29.58	19 53 02.7	12.74	0.0208	26.0	0.75	73	18	67	9	25ID, N3862, CL	GAL

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I. COMPLETE LISTING OF EXTRAGALACTIC SOURCES

3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
265.0	11 42 52.0	31 50 29.1	20.9	0.811	19.5	C- 0.96	75	18	147	10	12ID,SE	GAL
266.0	11 43 04.27	30 02 47.0	22.	1.275	11.1	C- 1.01	64	169	148	90	18X,SE	GAL
267.0	11 47 22.07	13 04 00.2	22.5	1.140	14.6	C- 0.93	70	154	148	9	SE	GAL
268.1	11 57 48.89	73 17 27.5	22.	0.97	21.4	C- 0.59	44		156	15	8*GSNEARBY;SE	GAL
268.2	11 58 24.8	31 50 02.	19.	0.362	9.7	1.0	78	18	999	3	SE,CL	GAL
268.3	12 03 54.28	64 30 18.6	20.0	0.371	10.7	C- 0.50	52	8	156	11	129Z,SE,CL	GAL
268.4	12 06 42.16	43 56 2.0	18.42	1.400	10.3	0.80	71	18	65	11		QSO
270.0	12 16 50.01	06 06 08.5	10.4	0.0073	51.8	0.51	67	68	31	113	79ID,N4261,CL	GAL
270.1	12 18 04.00	33 59 50.0	18.61	1.519	13.6	C- 0.75	81	47	63	90	ABS	QSO
272.0	12 21 59.7	42 23 13.3	20.		8.0	0.87	74	18		9	8ID	*GAL
272.1	12 22 31.45	13 09 49.6	8.67	0.0031	19.4	0.60	74	25	31	117	N4374,WE,CL	GAL
273.0	12 26 33.35	02 19 42.0	12.80*	0.158	62.8	CX 0.23	64	101	102	92	111SP	QSO
274.0	12 28 17.55	12 40 01.5	8.70	0.0043	1050.	0.76	75	80	31	120	M87,30SP,CL	GAL
274.1	12 32 56.74	21 37 05.8	20.	0.422	16.5	C- 0.87	83	18	152	9	R=173	GAL
275.0	12 39 45.16	-04 29 53.9	21.	0.480	14.5	C- 0.68	58	8	167	16	CL, SE(167)	GAL
275.1	12 41 27.58	16 39 18.0	19.	0.557	18.3	C- 0.96	79	47	61	90		QSO
277.0	12 49 27.	50 50 40.	R21.		7.5	0.89	67			9	9*RSO,M=18,19	
277.1	12 50 15.13	56 50 36.4	17.93	0.320	8.5	C- 0.64	60	47	63	11	159SED	QSO
277.2	12 51 03.85	15 58 47.1	21.5	0.766	12.0	1.02	78	151	148	10	ID 169,SE	GAL
277.3	12 51 46.29	27 53 49.5	15.94	0.0857	9.0	0.58	89	18	67	11	E,COMA A	GAL
280.0	12 54 41.36	47 36 32.1	22.	0.996	23.7	C- 0.81	70	8	164	11	PAIR,CL;SE	GAL
280.1	12 58 14.09	40 25 16.2	19.44	1.659	9.2	0.93	77	47	61	9		QSO
284.0	13 08 41.38	27 44 02.6	18.	0.2394	11.3	0.95	86	18	4	3	SE,CL,R=173	GAL
285.0	13 19 05.22	42 50 55.7	15.99	0.0794	11.3	0.95	73	18	94	9	139ID,WE,R173	GAL
286.0	13 28 49.65	30 45 58.5	17.25	0.849	25.0	C- 0.24	81	56	87	122	104ABS,159SED	QSO
287.0	13 28 15.93	25 24 37.4	17.67	1.055	16.3	C- 0.42	81	59	54	112		QSO
287.1	13 30 20.46	02 16 09.0	18.27	0.2159	8.2	+ 0.52	63	18	26	113	142ID,SE	N
288.0	13 36 38.59	39 06 21.8	18.3	0.246	18.9	C- 0.85	75	18	156	11	CL,WE,ABS.	GAL
288.1	13 40 29.94	60 36 48.4	18.12	0.961	9.0	C- 0.84	56	18	65	11	139ID	QSO
289.0	13 43 27.41	50 01 32.1	23.	0.9674	12.0	C- 0.81	65	154	148	90	8EF,SE	GAL
292.0	13 49 13.18	64 44 24.2	20.7	0.71	10.1	0.80	51	149	150	151	SE	GAL
293.0	13 50 03.20	31 41 32.8	14.37	0.0452	12.7	C- 0.45	76	17	26	15	93Z,E,R=173	GAL
293.1	13 52 16.31	16 29 33.8	R		9.2	0.99	72			9		
294.0	14 04 33.99	34 25 37.1	R		10.3	1.07	72			10	8EF	
295.0	14 09 33.44	52 26 13.6	20.20	0.4614	83.5	SC 0.63	61	81	81	11	E,CL,SE(3727)	GAL
296.0	14 14 26.37	11 02 18.6	12.19	0.0237	13.0	CX 0.67	62	18	26	113	IC5532,ABS	GAL
297.0	14 14 47.7	-03 46 56.	21.9	1.4061	10.3	+ 0.98	52	130	150	121	VERY COMP; SE	N
298.0	14 16 38.77	06 42 20.8	16.79	1.439	47.5	SC 0.99	61	107	61	112	ABS	QSO
299.0	14 19 06.29	41 58 30.2	19.48	0.367	11.8	C- 0.65	67	18	45	3	8ID,SE,CL	GAL
300.0	14 20 40.10	19 49 13.2	18.	0.270	17.9	0.75	68	18	14	3	142ID,R=173	GAL

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I. COMPLETE LISTING OF EXTRAGALACTIC SOURCES

3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
300.1	14 25 56.60	-01 10 44.	R19.	0.308	14.1	C- 0.68	53	179		179	140=OLD ID.	*GAL
303.0	14 41 24.84	52 14 18.7	17.01	0.141	11.2	0.76	58	133	132	131	CL	N
303.1	14 43 53.7	77 20 05.	19.	0.267	8.1	SC 0.77	38	29	156	29	18X, 5*QM=19SE	GAL
305.0	14 48 17.58	63 28 36.4	13.74	0.0410	15.7	0.85	49	18	26	11	12ID, SE	GAL
305.1	14 47 49.0	77 08 46.0	21.37	1.132	4.6	SC 0.48	39	153	150	29	SE	GAL
306.1	14 52 24.5	-04 08 47.	19.	0.441	13.5	0.90	47	18	156	126	CL, SE	GAL
309.1	14 58 56.64	71 52 11.2	16.78	0.904	22.7	C- 0.53	41	18	62	122	65, 48Z, ABS159	QSO
310.0	15 02 46.88	26 12 35.4	15.24	0.0540	55.1	C- 0.92	60	68	67	10	76ID, E, GROUP	GAL
313.0	15 08 32.66	08 02 48.2	21.0	0.461	20.6	0.82	52	17	143	172	SE	GAL
314.1	15 10 11.41	70 57 09.3	17.	0.1197	10.6	C- 0.95	42	18	156	10	CL, WE	GAL
315.0	15 11 30.01	26 18 39.4	16.30	0.1083	17.8	0.72	58	68	67	173	76ID, SE, CL	GAL
317.0	15 14 17.00	07 12 16.2	13.50	0.0350	49.0	C- 1.02	50	25	67	16	76ID, E, CL	GAL
318.0	15 17 50.64	20 26 52.7	20.3	0.752	12.3	C- 0.78	55	18	49	90	WE, CL, R=173	N
318.1	15 19 23.6	07 52 12.	15.	0.046	11.3	C- 1.93	49	139	156	121	N5820, ABS	GAL
319.0	15 22 43.90	54 38 38.4	18.5	0.192	15.3	0.90	51	17	156	9	CL, WE, R=173	GAL
320.0	15 29 29.70	35 43 48.5	18.	0.342	9.1	C- 0.75	55	18	156	10	ABS, CL	GAL
321.0	15 29 33.50	24 14 26.5	16.	0.096	13.5	C- 0.60	54	44	156	106	DBNUC, SE, R173	GAL
322.0	15 33 46.20	55 46 46.0	23.		10.1	C- 0.78	49	170		9	18X, ID 158	GAL
323.0	15 40 48.2	60 25 08.	R		8.4	C- 0.81	49			162		
323.1	15 45 31.11	21 01 32.5	16.69*	0.264	9.7	C- 0.65	49	18	65	11	111SP, CL, 159S	QSO
324.0	15 47 37.3	21 34 42.	21.5	1.2063	15.8	C- 0.90	49	8	166	90	CL, SE	GAL
325.0	15 49 13.98	62 50 21.3	21.	0.86	15.6	C- 0.70	44	152	150	10	N	GAL
326.0	15 49 56.13	20 14 18.2	17.	0.0895	20.4	CX 0.88	48	2	156	10	18X, PAIR	GAL
326.1	15 53 57.2	20 12 58.	R		8.2	0.13	47			90	8EF	
327.0	15 59 55.60	02 06 24.0	15.88	0.1039	35.3	C- 0.61	38	68	67	113	77ID, SE, CL	GAL
327.1	16 02 12.96	01 25 58.7	20.5	0.4628	23.6	C- 0.81	37	153	150	90	SE	GAL
330.0	16 09 13.90	66 04 22.8	20.33	0.550	27.8	C- 0.71	41	8	50	9	129Z, SE, CL	GAL
332.0	16 15 47.27	32 29 45.0	16.	0.1515	9.6	C- 0.61	45	17	4	3	SE, CL	GAL
334.0	16 18 07.40	17 43 30.5	16.41*	0.555	10.9	0.86	41	17	87	9	142ID, 88Z, 159	QSO
336.0	16 22 32.45	23 52 02.0	17.47	0.927	11.5	C- 0.73	42	47	61	11		QSO
337.0	16 27 19.07	44 25 38.2	21.	0.635	11.8	C- 0.63	44	8	150	15	CL, MODEMID169	GAL
338.0	16 26 55.38	39 39 37.0	12.61	0.0298	46.9	C- 1.19	44	74	83	9	N6166, WE, CL	GAL
340.0	16 27 29.41	23 26 42.6	22.	0.7754	10.1	0.73	41	165	148	9	9*FT RO, CORE	GAL
341.0	16 26 02.4	27 48 14.	19.	0.448	10.8	C- 0.85	42	18	156	9	SE, ID 169	GAL
343.0	16 34 01.12	62 51 42.4	20.61	0.988	12.4	C- 0.37	39	72	20	71		QSO
343.1	16 37 55.22	62 40 35.0	20.71	0.750	11.5	C- 0.32	39	72	145	71	SE(3727)	GAL
345.0	16 41 17.60	39 54 10.7	15.96*	0.594	10.8	CX 0.27	41	59	87	120	88Z	QSO
346.0	16 41 34.56	17 21 20.7	17.2	0.161	10.9	CX 0.52	36	18	156	11	159, 139ID, WE	GAL
348.0	16 48 39.98	05 04 35.0	16.90	0.154	351.0	1.00	29	68	85	113	HER A, E, R174	GAL
349.0	16 58 04.44	47 07 20.3	19.	0.205	13.3	0.74	38	17	156	9	SE	GAL

THE REVISED THIRD CAMBRIDGE CATALOG OF RADIO SOURCES

I. COMPLETE LISTING OF EXTRAGALACTIC SOURCES

3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
351.0	17 04 03.51	60 48 31.3	15.28	0.371	13.7	0.73	36	18	87	3	159SED	QSO
352.0	17 09 18.0	46 05 06.0	22.8	0.8057	11.3 C-	0.88	36	8	147	90	SE	GAL
353.0	17 17 53.29	-00 55 49.5	15.36	0.0304	236.0	0.71	20	68	67	113	75ID, E	GAL
356.0	17 23 06.96	51 00 14.1	21.5	1.079	11.3	1.02	34	170	164	9	8EF, SE	GAL
357.0	17 26 27.41	31 48 23.9	15.5	0.1664	9.7 C-	0.57	31	18	4	3	139ID, WE, CL	GAL
368.0	18 02 45.60	11 01 13.8	21.5	1.132	13.8	1.24	15	154	164	5	SE, EXTENDED	GAL
371.0	18 07 18.47	69 48 59.0	14.81*	0.0500	3.7 CX	0.30	29	18	26	112	109SP, E	N
379.1	18 25 55.93	74 19 06.8	18.	0.256	7.4	0.68	28	18	156	160	SE	GAL
380.0	18 28 13.55	48 42 40.4	16.81*	0.691	59.4 +	0.71	24	59	87	71	88Z, 159SED	QSO
381.0	18 32 24.40	47 24 36.5	17.46	0.1605	16.6 C-	0.81	23	18	94	3	SE	GAL
382.0	18 33 11.97	32 39 18.2	14.73	0.0578	19.9	0.59	17	18	67	116	25ID, 82SP, SE	GAL
386.0	18 36 12.85	17 09 06.7	12.93	0.0170	23.9 C-	0.59	11	25	70	10	67X, 999Z, ABS	GAL
388.0	18 42 35.44	45 30 21.7	15.68	0.0908	24.6 C-	0.70	20	25	67	11	WE, CL	GAL
389.0	18 43 41.	-03 23 00.			21.0		0				OBSCURED	
390.0	18 43 12.	09 49 00.			21.0	0.71	6			16	OBSCURED	
390.3	18 45 37.57	79 43 06.5	14.37*	0.0561	47.5	0.75	27	18	26	159	12ID, SE, 82SP	N
394.0	18 57 02.	12 56 00.			15.1 C-	0.78	4			90	OBSCURED	
399.1	19 14 00.	30 14 40.	R		13.5	0.78	9			24	R=173	
401.0	19 39 38.84	60 34 32.6	19.1	0.201	20.9 C-	0.71	18	17	156	15	12, 37ID, CL, AB	GAL
402.0	19 40 22.5	50 29 29	14.	0.0239	10.1 C-	0.56	13	17	4	3	ABS, CL	GAL
403.0	19 49 44.13	02 22 41.5	15.42	0.059	17.8	0.45	-12	17	134	113	142ID	GAL
403.1	19 49 55.20	-01 25 07.2	16.	0.0554	13.5	1.12	-14	18	4	128	140ID, ABS, CL	GAL
405.0	19 57 44.43	40 35 45.2	16.22	0.0565	8700. C-	0.74	6	30	30	28	108SP, CYGA, SE	GAL
409.0	20 12 18.23	23 25 47.5	R		76.6 C-	0.78	-6			10	OBSCRD., X=176	
410.0	20 18 03.97	29 32 41.9	19.5		34.6 C-	0.56	-4	161		106	OBSCURED	*GAL
411.0	20 19 44.19	09 51 33.8	19.70*	0.467	16.5 C-	0.79	-15	40	40	11	SE	N
415.2	20 31 28.3	53 35 28.6	R		8.8	1.03	8			9		
418.0	20 37 07.3	51 08 35.	20.	1.686	13.1 +	0.44	6	8	171	71		QSO
424.0	20 45 44.40	06 50 10.2	18.	0.127	14.6	0.85	-22	17	156	16	142ID, WE, CL	GAL
427.1	21 04 44.80	76 21 09.5	23.3	0.572	26.6 C-	0.97	19	6	177	11	ABS	GAL
428.0	21 06 45.2	49 21 54.			16.6	0.66	1			106	OBSCURED	
430.0	21 17 02.66	60 35 26.7	15.	0.0541	33.7	0.72	8	18	4	173	25ID, ABS, CL	GAL
431.0	21 17 12.5	49 21 36.			24.2 C-	0.94	0			24	OBSCURED	
432.0	21 20 25.53	16 51 46.4	17.96	1.805	11.0 C-	0.98	-23	18	63	10	142, 37ID, 159S	QSO
433.0	21 21 30.00	24 51 36.0	15.54	0.1016	56.2 C-	0.75	-18	25	67	11	76ID, 37, SE	GAL
434.0	21 20 54.40	15 35 11.7	20.84	0.322	4.8 C-	0.61	-24	37	156	11	WE, CL	GAL
435.0	21 26 37.2	07 19 50.	21.	0.471	11.6	0.87	-30	156	156	10	18X, EM OII.	GAL
436.0	21 41 57.91	27 56 30.3	18.15	0.2145	17.8	0.86	-19	18	67	3	12, 37ID, SE	GAL
437.0	21 45 01.4	15 06 36.			14.6 C-	0.79	-28	158		10	8, 37EF; IR DET	*GAL
438.0	21 53 45.42	37 46 13.1	19.20	0.290	44.7 C-	0.88	-13	37	156	15	WE	GAL

THE REVISED THIRD CAMBRIDGE CATALOG OF RADIO SOURCES

I. COMPLETE LISTING OF EXTRAGALACTIC SOURCES

3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
441.0	22 03 49.27	29 14 43.8	21.	0.707	12.6	0.83	-21	154	155	10	SE	GAL
442.0	22 12 20.40	13 35 31.0	13.68	0.0263	16.1 C-	0.96	-34	68	85	10	N7236/7,77ID	GAL
445.0	22 21 15.50	-02 21 16.0	15.77	0.0562	24.8	0.85	-47	25	67	28	SE,CL	N
449.0	22 29 07.60	39 06 03.4	13.15	0.0171	11.5	0.58	-16	18	94	10	ABS,CL	GAL
452.0	22 43 32.81	39 25 27.6	16.00	0.0811	54.4	0.78	-17	18	67	3	37ID,SE	GAL
454.0	22 49 07.63	18 32 43.7	18.47*	1.757	11.6	0.90	-36	18	63	71	142,37ID	QSO
454.1	22 48 58.87	71 13 23.7			9.8 C-	0.82	11			11	37*CL,M=21.	
454.2	22 50 24.	64 48 00.			8.8 C-	0.61	5			106	OBSCURED	
454.3	22 51 29.53	15 52 54.4	16.10*	0.860	13.0 CX	0.04	-39	23	48	120	65Z,159SED	QSO
455.0	22 52 34.53	12 57 33.5	19.7	0.5427	12.8 C-	0.71	-41	22	22	90		QSO
456.0	23 09 56.65	09 03 07.8	18.54	0.2330	10.6 C-	0.69	-46	18	67	90	SE	GAL
458.0	23 10 21.9	05 00 26.	20.	0.290	14.5 C-	0.76	-50	8	156	113	SE,CL	GAL
459.0	23 14 02.27	03 48 55.2	17.55	0.2199	25.6 C-	0.74	-51	18	67	90	12ID,93Z,E	N
460.0	23 18 59.75	23 30 20.4	18.8	0.268	8.2	0.80	-35	19	35	11	8,37,27ID,CL	GAL
465.0	23 35 58.95	26 45 16.4	13.18	0.0293	37.8	0.75	-33	25	67	116	N7720,76ID,SE	GAL
468.1	23 48 36.	64 24 00.			30.0 C-	0.78	3			106	OBSCURED	
469.1	23 52 58.66	79 38 36.8	22.5	1.336	11.1	0.96	18	37	148	166	9 37ID,MODEM	GAL
470.0	23 56 02.90	43 48 03.6	R		10.1 C-	0.77	-18			3	18ID=M*(153)	

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THE REVISED THIRD CAMBRIDGE CATALOG OF RADIO SOURCES

II. RADIO GALAXIES SOURCES

3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
6.1	00 13 34.48	79 00 10.4	22.	0.840	13.7 C-	0.80	17	37	147	11	SE	GAL
13.0	00 31 33.17	39 07 41.8	22.5	1.351	12.0	0.93	-23	148	148	9	SE; ID(157)OUT	GAL
15.0	00 34 30.56	-01 25 37.8	15.34	0.0730	15.8 C-	0.64	-64	92	93	91	WE	GAL
16.0	00 35 09.16	13 03 39.6	21.	0.405	11.2	0.94	-50	170	150	90	WE	GAL
17.0	00 35 47.18	-02 24 09.5	18.02	0.2197	20.0	0.52	-65	18	67	121	SE	N
18.0	00 38 14.57	09 46 56.1	18.5	0.188	19.0	0.74	-53	18	156	16	SE	GAL
19.0	00 38 13.76	32 53 39.9	20.	0.482	12.1 C-	0.60	-30	8	129	90	*CL	GAL
20.0	00 40 20.00	51 47 08.1	19.	0.350	42.9	0.67	-11	27		15		GAL
22.0	00 48 04.73	50 55 44.8	22.	0.937	12.1 C-	0.78	-12	170	155	15	SE	GAL
28.0	00 53 09.12	26 08 23.4	17.64	0.1952	16.3	1.06	-37	18	67	3	E, CL, 175, R	GAL
29.0	00 55 01.57	-01 39 39.4	14.07	0.0447	15.1	0.50	-64	18	94	128	78ID, ABS, CL	GAL
31.0	01 04 39.18	32 08 44.3	12.14	0.0167	16.8	0.57	-30	18	31	9	N382/3, ABS, CL	GAL
33.0	01 06 14.94	13 04 26.4	15.19	0.0595	54.4	0.76	-49	68	67	160	73ID, SE	GAL
33.1	01 06 06.48	72 55 59.2	19.5	0.181	13.0 C-	0.62	10	37	35	9	PAIR	GAL
34.0	01 07 32.58	31 31 22.5	21.	0.689	11.9	1.06	-31	170	164	9	SE, IDI54	GAL
35.0	01 09 04.14	49 12 40.1	15.6	0.0670	10.5	0.77	-13	18	4	10	WE	GAL
40.0	01 23 26.00	-01 36 20.0	12.28	0.0177	26.0	0.66	-63	74	97	68	N545/7, ABS, CL	GAL
41.0	01 23 54.73	32 57 37.7	21.	0.794	10.6	0.51	-29			10		GAL
42.0	01 25 42.67	28 47 30.4	20.	0.395	12.0 C-	0.73	-33	19	156	10	8, 37ID, SE	GAL
44.0	01 28 47.7	06 15 36.	R21.	0.66	7.9	0.83	-55	150	150	10	10*G CL, SE	GAL
46.0	01 32 34.09	37 38 47.0	19.5	0.4373	10.2	1.13	-24	18	156	9	37ID, *CL, SE	GAL
49.0	01 38 28.41	13 38 19.9	21.	0.621	10.3 C-	0.65	-47	19	150	90	8, 37ID, SE	GAL
52.0	01 45 14.5	53 17 47.	18.5	0.2854	13.5 C-	0.62	-8	18	150	118	CL, ABS, R=173	GAL
54.0	01 52 26.55	43 31 19.	22.	0.8274	8.8	0.82	-18	8	150	9	37ID	GAL
55.0	01 54 19.50	28 37 04.8	20.8	0.240	21.5	1.04	-32	37	156	9	WE, SE	GAL
61.1	02 10 37.1	86 05 18.5	19.0	0.186	31.2 C-	0.77	24	33	33	160	GAL B	GAL
63.0	02 18 21.90	-02 10 33.	18.5	0.175	19.2	0.79	-57	18	156	16	12, 140ID, SE	GAL
65.0	02 20 37.24	39 47 17.1	23.	1.176	15.2 C-	0.75	-20	154	150	10	8, 37 WE	GAL
66.0	02 20 01.78	42 45 54.6	12.90	0.0215	24.6	0.62	-17	97	97	60	ABS, CL	GAL
67.0	02 21 18.05	27 36 37.4	18.0	0.3102	10.0 C-	0.58	-31	18	35	11	139, 37ID	GAL
68.2	02 31 24.84	31 21 11.2	R24.		10.0 C-	1.05	-26	158		11	8, 37, 6EF	GAL
71.0	02 40 07.04	-0 13 34.3	8.91	0.0034	16.1 C-	0.55	-52	32	31	90	N1068, SE	GAL
75.0	02 55 05.10	05 50 44.0	13.62	0.0240	25.8	0.71	-45	68	97	113	78ID, ABS, CL	GAL
76.1	03 00 27.28	16 14 36.1	14.86	0.0324	12.2	0.77	-36	18	93	9	142, 139ID, ABS	GAL
78.0	03 05 49.05	03 55 13.1	12.84	0.0288	17.8	0.43	-45	68	67	90	75ID, N1218, WE	GAL
79.0	03 07 11.48	16 54 36.9	18.50	0.2559	30.5 C-	0.92	-35	18	67	9	12ID, SE, *CL	N
83.1	03 14 57.	41 40 33.4	12.5	0.0255	26.0	0.64	-13	25	89	36	N1265, CL	GAL
84.0	03 16 29.55	41 19 51.9	11.85	0.0172	61.3 CX	0.78	-13	30	31	38	N1275, PERA, CL	GAL
88.0	03 25 18.90	02 23 22.0	13.95	0.0302	15.3	0.52	-42	18	67	113	25ID, E,	GAL
89.0	03 31 43.37	-01 21 26.3	16.	0.1386	20.2	0.96	-43	18	156	24	12ID, ABS, CL	GAL

THE REVISED THIRD CAMBRIDGE CATALOG OF RADIO SOURCES

II. RADIO GALAXIES SOURCES

3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
93.1	03 45 35.80	33 44 05.9	19.0	0.244	9.9 C-	0.70	-16	18	156	90	37ID, SE, CL	GAL
98.0	03 56 10.49	10 17 16.4	14.45	0.0306	47.2	0.78	-31	68	67	15	77ID, SE	GAL
99.0	03 58 33.28	00 28 10.6	19.1	0.426	10.8 CX	1.05	-37	8	46	29	SE, *CL	N
103.0	04 04 34.73	42 52 36.3	19.	0.33	26.6 C-	0.79	-7	161	150	9	9*G, R=173, SE	GAL
105.0	04 04 48.07	03 34 27.2	18.5	0.089	17.8	0.58	-34	6	156	113	SE	GAL
109.0	04 10 54.85	11 04 39.5	17.88*	0.3056	21.6	0.85	-28	18	93	3	12ID, SE	N
111.0	04 15 01.	37 54 20.	18.0	0.0485	64.6 +	0.73	-9	37	35	123	SE, R=173	GAL
119.0	04 29 07.86	41 32 09.5	20.	0.408	15.7	0.22	-4	47	129	71	72ID	GAL
123.0	04 33 55.21	29 34 12.6	21.7	0.218	189.0	0.70	-12	37	163	11	18, 12ID, E, CL	GAL
129.0	04 45 21.2	44 56 45.	19.	0.021	46.9	0.92	0	18	52	36	ABS	GAL
129.1	04 46 29.9	44 58 14.	19.	0.022	10.5	0.89	0	58	52	36	ABS	GAL
130.0	04 48 56.9	51 59 56.	16.5	0.109	15.5	0.89	5	18	156	106	ABS	GAL
132.0	04 53 42.05	22 44 43.4	18.5	0.214	13.7	0.68	-13	18	156	15	E, CL	GAL
133.0	04 59 54.27	25 12 12.1	20.	0.2775	22.3	0.70	-10	169	156	10	OBSCURED, SE	GAL
135.0	05 11 33.78	00 53 07.9	17.05	0.1273	17.3	0.92	-21	18	94	113	142ID, SE, CL	N
136.1	05 12 58.90	24 55 07.4	17.	0.064	14.0	0.69	-8	18	999	126	SE, R=173	GAL
153.0	06 05 44.46	48 04 49.0	18.5	0.2769	15.3 C-	0.66	13	18	4	11	12ID, SE, CL	GAL
165.0	06 40 04.60	23 22 01.2	19.5	0.29	13.5 C-	0.71	9	161	150	113	R=173; ABS, WE	GAL
166.0	06 42 24.73	21 25 02.8	19.5	0.245	14.7 +	0.90	8	18	156	5	MOD EM, R=173	GAL
169.1	06 47 35.5	45 13 01.	20.5	0.633	7.3	0.90	19	152	156	10	SE	GAL
171.0	06 51 11.05	54 12 50.0	18.89	0.2384	19.5	0.87	22	18	67	11	77ID, SE	N
172.0	06 59 04.13	25 18 15.4	20.5	0.5191	15.1 C-	0.86	13	151	150	125	8EF, SE	GAL
173.1	07 02 47.91	74 54 16.6	18.9	0.292	15.4 C-	0.88	27	18	999	9	ABS, CL	GAL
175.1	07 11 14.36	14 41 35.0	21.5	0.920	11.4 C-	0.91	12	154	164	16	DE SE	GAL
180.0	07 24 33.27	-01 58 24.4	19.	0.22	15.1	0.84	7	18	177	113	140ID, SE	GAL
184.0	07 33 59.01	70 30 01.1	21.5	0.994	13.2 C-	0.86	30	154	168	106	STRONG E; Z164	GAL
184.1	07 34 25.05	80 33 24.1	17.	0.1182	13.0 C-	0.68	29	18	4	3	35Z, SE, CL	GAL
187.0	07 42 27.94	02 07 44.6	19.5	0.350	8.1	0.82	13	18	156	113	ABS	GAL
192.0	08 02 32.31	24 18 54.9	15.46	0.0598	21.1	0.79	26	18	26	118	12ID, 4Z, SE, CL	GAL
196.1	08 12 57.32	-02 59 13.9	17.5	0.198	18.6	1.16	17	18	156	41	140ID, SE	GAL
197.1	08 18 00.86	47 12 11.0	16.5	0.1301	8.1	0.69	35	18	103	3	ABS, CL	GAL
198.0	08 19 52.33	06 06 47.0	16.78	0.0815	9.7 C-	0.69	23	18	67	113	68ID, SE, CL	GAL
200.0	08 24 21.43	29 28 42.2	20.	0.458	11.3	0.84	33	18	156	5	139ID, WE	GAL
208.1	08 51 53.28	14 17 19.5	20.	1.02	8.1 C-	0.65	34	19	150	90		N
210.0	08 55 10.8	28 02 32.7	22.		9.5 C-	0.78	39	39		5	ID=150	GAL
213.1	08 58 05.15	29 13 34.5	19.	0.194	6.6	0.55	40	18	156	5	SE, CL	GAL
217.0	09 05 41.10	38 00 30.6	22.	0.8975	11.3 C-	0.77	43	169	148	10		GAL
219.0	09 17 50.70	45 51 44.2	17.22	0.1744	41.2 C-	0.81	45	68	67	15	76ID, SE, CL	GAL
220.1	09 26 31.87	79 19 45.4	20.5	0.61	15.8 C-	0.93	33	169	150	9	18X, SE	GAL
220.3	09 31 11.06	83 28 54.9	20.5	0.68	15.7 C-	0.75	31	154	150	5	SE	GAL

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II. RADIO GALAXIES SOURCES

3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	Z	RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
223.0	09 36 50.86	36 07 34.7	17.10	0.1368	14.7	0.74	49	18	26	3	12ID,SE,CL	GAL
223.1	09 38 18.8	39 58 22.	16.36	0.1075	6.0	0.56	49	18	26	3	SE	GAL
225.0B	09 39 32.4	13 59 29.	19.	0.58	21.3 C-	0.94	44	8	150	125	MOD EM,ID 169	GAL
226.0	09 41 36.2	10 00 05.1	19.5	0.823	15.0 C-	0.88	43	18	150	10	139ID,SE	GAL
227.0	09 45 07.80	07 39 09.0	16.33	0.0861	30.4	0.67	42	18	94	113	25ID,SE	N
228.0	09 47 27.72	14 34 02.9	21.	0.5524	21.8	1.00	46	169	150	10	8EF,SE	GAL
231.0	09 51 42.7	69 55 03.	8.39	0.0009	14.6 C-	0.28	40	100	31	124	M82,E	GAL
234.0	09 58 57.38	29 01 37.4	17.27	0.1848	31.4 C-	0.86	53	25	67	3	77ID,SE,R=173	N
236.0	10 03 05.39	35 08 48.0	15.97	0.0989	14.4	0.51	54	18	94	11	E	GAL
237.0	10 05 22.04	07 44 58.6	R21.	0.877	20.9 C-	0.53	47	178	178	90	RADIO 172	GAL
238.0	10 08 23.1	06 39 26.5	22.5	1.405	16.6 C-	0.82	47	6	148	90	MODEM.	GAL
239.0	10 08 38.97	46 43 08.4	22.5	1.781	13.2 C-	1.08	53	154	177	11	REF=180,UV SP	GAL
241.0	10 19 09.44	22 14 40.7	23.5	1.617	11.6 C-	0.97	56	154	148	29	8EF,WE	GAL
244.1	10 30 19.61	58 30 04.3	19.	0.428	20.3 C-	0.82	51	18	156	173	12ID,CL,SE	GAL
247.0	10 56 08.35	43 17 29.5	21.5	0.7489	10.6 C-	0.61	62	169	150	10	8EF,MOD EM	GAL
252.0	11 08 48.84	35 56 59.8	22.	1.10	11.0	1.03	67	169	148	9	9*BSO,M=19;SE	GAL
256.0	11 18 04.15	23 44 21.2	21.5	1.819	9.3	0.89	69	72	148	71	SE	GAL
258.0	11 22 06.42	19 35 58.8	19.5	0.165	9.7 +	1.30	69	18	156	27	E,CL;MOD EM	GAL
263.1	11 40 49.21	22 23 35.0	20.	0.366	18.2 C-	0.87	74	8	150	90	ID 169; WE	GAL
264.0	11 42 29.58	19 53 02.7	12.74	0.0208	26.0	0.75	73	18	67	9	25ID,N3862,CL	GAL
265.0	11 42 52.0	31 50 29.1	20.9	0.811	19.5 C-	0.96	75	18	147	10	12ID,SE	GAL
266.0	11 43 04.27	30 02 47.0	22.	1.275	11.1 C-	1.01	64	169	148	90	18X,SE	GAL
267.0	11 47 22.07	13 04 00.2	22.5	1.140	14.6 C-	0.93	70	154	148	9	SE	GAL
268.1	11 57 48.89	73 17 27.5	22.	0.97	21.4 C-	0.59	44		156	15	8*GSNEARBY;SE	GAL
268.2	11 58 24.8	31 50 02.	19.	0.362	9.7	1.0	78	18	999	3	SE,CL	GAL
268.3	12 03 54.28	64 30 18.6	20.0	0.371	10.7 C-	0.50	52	8	156	11	129Z,SE,CL	GAL
270.0	12 16 50.01	06 06 08.5	10.4	0.0073	51.8	0.51	67	68	31	113	79ID,N4261,CL	GAL
272.1	12 22 31.45	13 09 49.6	8.67	0.0031	19.4	0.60	74	25	31	117	N4374,WE,CL	GAL
274.0	12 28 17.55	12 40 01.5	8.70	0.0043	1050.	0.76	75	80	31	120	M87,30SP,CL	GAL
274.1	12 32 56.74	21 37 05.8	20.	0.422	16.5 C-	0.87	83	18	152	9	R=173	GAL
275.0	12 39 45.16	-04 29 53.9	21.	0.480	14.5 C-	0.68	58	8	167	16	CL, SE(167)	GAL
277.2	12 51 03.85	15 58 47.1	21.5	0.766	12.0	1.02	78	151	148	10	ID 169,SE	GAL
277.3	12 51 46.29	27 53 49.5	15.94	0.0857	9.0	0.58	89	18	67	11	E,COMA A	GAL
280.0	12 54 41.36	47 36 32.1	22.	0.996	23.7 C-	0.81	70	8	164	11	PAIR,CL;SE	GAL
284.0	13 08 41.38	27 44 02.6	18.	0.2394	11.3	0.95	86	18	4	3	SE,CL,R=173	GAL
285.0	13 19 05.22	42 50 55.7	15.99	0.0794	11.3	0.95	73	18	94	9	139ID,WE,R173	GAL
287.1	13 30 20.46	02 16 09.0	18.27	0.2159	8.2 +	0.52	63	18	26	113	142ID,SE	N
288.0	13 36 38.59	39 06 21.8	18.3	0.246	18.9 C-	0.85	75	18	156	11	CL,WE,ABS.	GAL
289.0	13 43 27.41	50 01 32.1	23.	0.9674	12.0 C-	0.81	65	154	148	90	8EF,SE	GAL
292.0	13 49 13.18	64 44 24.2	20.7	0.71	10.1	0.80	51	149	150	151	SE	GAL

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II. RADIO GALAXIES SOURCES

3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
293.0	13 50 03.20	31 41 32.8	14.37	0.0452	12.7	C- 0.45	76	17	26	15	93Z, E, R=173	GAL
295.0	14 09 33.44	52 26 13.6	20.20	0.4614	83.5	SC 0.63	61	81	81	11	E, CL, SE(3727)	GAL
296.0	14 14 26.37	11 02 18.6	12.19	0.0237	13.0	CX 0.67	62	18	26	113	IC5532, ABS	GAL
297.0	14 14 47.7	-03 46 56.	21.9	1.4061	10.3	+ 0.98	52	130	150	121	VERY COMP; SE	N
299.0	14 19 06.29	41 58 30.2	19.48	0.367	11.8	C- 0.65	67	18	45	3	8ID, SE, CL	GAL
300.0	14 20 40.10	19 49 13.2	18.	0.270	17.9	0.75	68	18	14	3	142ID, R=173	GAL
303.0	14 41 24.84	52 14 18.7	17.01	0.141	11.2	0.76	58	133	132	131	CL	N
303.1	14 43 53.7	77 20 05.	19.	0.267	8.1	SC 0.77	38	29	156	29	18X, 5*GM=19SE	GAL
305.0	14 48 17.58	63 28 36.4	13.74	0.0410	15.7	0.85	49	18	26	11	12ID, SE	GAL
305.1	14 47 49.0	77 08 46.0	21.37	1.132	4.6	SC 0.48	39	153	150	29	SE	GAL
306.1	14 52 24.5	-04 08 47.	19.	0.441	13.5	0.90	47	18	156	126	CL, SE	GAL
310.0	15 02 46.88	26 12 35.4	15.24	0.0540	55.1	C- 0.92	60	68	67	10	76ID, E, GROUP	GAL
313.0	15 08 32.66	08 02 48.2	21.0	0.461	20.6	0.82	52	17	143	172	SE	GAL
314.1	15 10 11.41	70 57 09.3	17.	0.1197	10.6	C- 0.95	42	18	156	10	CL, WE	GAL
315.0	15 11 30.01	26 18 39.4	16.30	0.1083	17.8	0.72	58	68	67	173	76ID, SE, CL	GAL
317.0	15 14 17.00	07 12 16.2	13.50	0.0350	49.0	C- 1.02	50	25	67	16	76ID, E, CL	GAL
318.0	15 17 50.64	20 26 52.7	20.3	0.752	12.3	C- 0.78	55	18	49	90	WE, CL, R=173	N
318.1	15 19 23.6	07 52 12.	15.	0.046	11.3	C- 1.93	49	139	156	121	N5820, ABS	GAL
319.0	15 22 43.90	54 38 38.4	18.5	0.192	15.3	0.90	51	17	156	9	CL, WE, R=173	GAL
320.0	15 29 29.70	35 43 48.5	18.	0.342	9.1	C- 0.75	55	18	156	10	ABS, CL	GAL
321.0	15 29 33.50	24 14 26.5	16.	0.096	13.5	C- 0.60	54	44	156	106	DBNUC, SE, R173	GAL
322.0	15 33 46.20	55 46 46.0	23.		10.1	C- 0.78	49	170		9	18X, ID 158	GAL
324.0	15 47 37.3	21 34 42.	21.5	1.2063	15.8	C- 0.90	49	8	166	90	CL, SE	GAL
325.0	15 49 13.98	62 50 21.3	21.	0.86	15.6	C- 0.70	44	152	150	10	N	GAL
326.0	15 49 56.13	20 14 18.2	17.	0.0895	20.4	CX 0.88	48	2	156	10	18X, PAIR	GAL
327.0	15 59 55.60	02 06 24.0	15.88	0.1039	35.3	C- 0.61	38	68	67	113	77ID, SE, CL	GAL
327.1	16 02 12.96	01 25 58.7	20.5	0.4628	23.6	C- 0.81	37	153	150	90	SE	GAL
330.0	16 09 13.90	66 04 22.8	20.33	0.550	27.8	C- 0.71	41	8	50	9	129Z, SE, CL	GAL
332.0	16 15 47.27	32 29 45.0	16.	0.1515	9.6	C- 0.61	45	17	4	3	SE, CL	GAL
337.0	16 27 19.07	44 25 38.2	21.	0.635	11.8	C- 0.63	44	8	150	15	CL, MODEMID169	GAL
338.0	16 26 55.38	39 39 37.0	12.61	0.0298	46.9	C- 1.19	44	74	83	9	N6166, WE, CL	GAL
340.0	16 27 29.41	23 26 42.6	22.	0.7754	10.1	0.73	41	165	148	9	9*FT RO, CORE	GAL
341.0	16 26 02.4	27 48 14.	19.	0.448	10.8	C- 0.85	42	18	156	9	SE, ID 169	GAL
343.1	16 37 55.22	62 40 35.0	20.71	0.750	11.5	C- 0.32	39	72	145	71	SE(3727)	GAL
346.0	16 41 34.56	17 21 20.7	17.2	0.161	10.9	CX 0.52	36	18	156	11	159, 139ID, WE	GAL
348.0	16 48 39.98	05 04 35.0	16.90	0.154	351.0	1.00	29	68	85	113	HER A, E, R174	GAL
349.0	16 58 04.44	47 07 20.3	19.	0.205	13.3	0.74	38	17	156	9	SE	GAL
352.0	17 09 18.0	46 05 06.0	22.8	0.8057	11.3	C- 0.88	36	8	147	90	SE	GAL
353.0	17 17 53.29	-00 55 49.5	15.36	0.0304	236.0	0.71	20	68	67	113	75ID, E	GAL
356.0	17 23 06.96	51 00 14.1	21.5	1.079	11.3	1.02	34	170	164	9	8EF, SE	GAL

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II. RADIO GALAXIES SOURCES

3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
357.0	17 26 27.41	31 48 23.9	15.5	0.1664	9.7 C-	0.57	31	18	4	3	139ID, WE, CL	GAL
368.0	18 02 45.60	11 01 13.8	21.5	1.132	13.8	1.24	15	154	164	5	SE, EXTENDED	GAL
371.0	18 07 18.47	69 48 59.0	14.81*	0.0500	3.7 CX	0.30	29	18	26	112	109SP, E	N
379.1	18 25 55.93	74 19 06.8	18.	0.256	7.4	0.68	28	18	156	160	SE	GAL
381.0	18 32 24.40	47 24 36.5	17.46	0.1605	16.6 C-	0.81	23	18	94	3	SE	GAL
382.0	18 33 11.97	32 39 18.2	14.73	0.0578	19.9	0.59	17	18	67	116	25ID, 82SP, SE	GAL
386.0	18 36 12.85	17 09 06.7	12.93	0.0170	23.9 C-	0.59	11	25	70	10	67X, 999Z, ABS	GAL
388.0	18 42 35.44	45 30 21.7	15.68	0.0908	24.6 C-	0.70	20	25	67	11	WE, CL	GAL
390.3	18 45 37.57	79 43 06.5	14.37*	0.0561	47.5	0.75	27	18	26	159	12ID, SE, 82SP	N
401.0	19 39 38.84	60 34 32.6	19.1	0.201	20.9 C-	0.71	18	17	156	15	12, 37ID, CL, AB	GAL
402.0	19 40 22.5	50 29 29	14.	0.0239	10.1 C-	0.56	13	17	4	3	ABS, CL	GAL
403.0	19 49 44.13	02 22 41.5	15.42	0.059	17.8	0.45	-12	17	134	113	142ID	GAL
403.1	19 49 55.20	-01 25 07.2	16.	0.0554	13.5	1.12	-14	18	4	128	140ID, ABS, CL	GAL
405.0	19 57 44.43	40 35 45.2	16.22	0.0565	8700. C-	0.74	6	30	30	28	108SP, CYGA, SE	GAL
411.0	20 19 44.19	09 51 33.8	19.70*	0.467	16.5 C-	0.79	-15	40	40	11	SE	N
424.0	20 45 44.40	06 50 10.2	18.	0.127	14.6	0.85	-22	17	156	16	142ID, WE, CL	GAL
427.1	21 04 44.80	76 21 09.5	23.3	0.572	26.6 C-	0.97	19	6	177	11	ABS	GAL
430.0	21 17 02.66	60 35 26.7	15.	0.0541	33.7	0.72	8	18	4	173	25ID, ABS, CL	GAL
433.0	21 21 30.00	24 51 36.0	15.54	0.1016	56.2 C-	0.75	-18	25	67	11	76ID, 37, SE	GAL
434.0	21 20 54.40	15 35 11.7	20.84	0.322	4.8 C-	0.61	-24	37	156	11	WE, CL	GAL
435.0	21 26 37.2	07 19 50.	21.	0.471	11.6	0.87	-30	156	156	10	18X, EM OII.	GAL
436.0	21 41 57.91	27 56 30.3	18.15	0.2145	17.8	0.86	-19	18	67	3	12, 37ID, SE	GAL
438.0	21 53 45.42	37 46 13.1	19.20	0.290	44.7 C-	0.88	-13	37	156	15	WE	GAL
441.0	22 03 49.27	29 14 43.8	21.	0.707	12.6	0.83	-21	154	155	10	SE	GAL
442.0	22 12 20.40	13 35 31.0	13.68	0.0263	16.1 C-	0.96	-34	68	85	10	N7236/7, 77ID	GAL
445.0	22 21 15.50	-02 21 16.0	15.77	0.0562	24.8	0.85	-47	25	67	28	SE, CL	N
449.0	22 29 07.60	39 06 03.4	13.15	0.0171	11.5	0.58	-16	18	94	10	ABS, CL	GAL
452.0	22 43 32.81	39 25 27.6	16.00	0.0811	54.4	0.78	-17	18	67	3	37ID, SE	GAL
456.0	23 09 56.65	09 03 07.8	18.54	0.2330	10.6 C-	0.69	-46	18	67	90	SE	GAL
458.0	23 10 21.9	05 00 26.	20.	0.290	14.5 C-	0.76	-50	8	156	113	SE, CL	GAL
459.0	23 14 02.27	03 48 55.2	17.55	0.2199	25.6 C-	0.74	-51	18	67	90	12ID, 93Z, E	N
460.0	23 18 59.75	23 30 20.4	18.8	0.268	8.2	0.80	-35	19	35	11	8, 37, 27ID, CL	GAL
465.0	23 35 58.95	26 45 16.4	13.18	0.0293	37.8	0.75	-33	25	67	116	N7720, 76ID, SE	GAL
469.1	23 52 58.66	79 38 36.8	22.5	1.336	11.1	0.96	18	37	148	166	9 37ID, MODEM	GAL

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III. QUASI-STELLAR SOURCES

3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
2.0	00 03 48.84	-00 21 06.0	19.35*	1.037	14.9	0.67	-61	47	48	90		QSO
9.0	00 17 49.83	15 24 16.5	18.21	2.012	17.8	1.09	-47	53	54	11	OKE(159), SED	QSO
14.0	00 33 29.30	18 21 28.4	20.	1.469	10.4 C-	0.81	-44	18	155	16	8, 19ID, RED Q?	QSO
43.0	01 27 15.04	23 22 51.5	20.	1.47	11.6	0.75	-39	47	150	90		QSO
47.0	01 33 40.42	20 42 10.6	18.10*	0.425	26.4	0.98	-41	55	55	11	96FC	QSO
48.0	01 34 49.82	32 54 20.4	16.2 *	0.367	55.0 SC	0.59	-29	56	57	112	OKE(159), SED	QSO
66.0	02 19 30.03	42 48 29.9	15.21		8.0	0.62	-17	43		60	LINELESS	BLO
68.1	02 29 27.24	34 10 34.1	19.5	1.238	12.8	0.80	-24	37	105	10	153Z	QSO
93.0	03 40 51.54	04 48 21.7	18.09	0.358	14.4 C-	0.82	-38	59	171	16	MOD EM	QSO
138.0	05 18 16.52	16 35 26.9	17.9	0.759	22.2 SC	-.46	-11	47	61	122	62Z	QSO
147.0	05 38 43.51	49 49 42.8	16.9 *	0.545	60.5 SC	-.46	10	55	55	122		QSO
154.0	06 10 43.75	26 05 30.	18.0	0.5804	23.1	0.77	4	3	42	3		QSO
175.0	07 10 15.38	11 51 24.0	16.6	0.768	17.6	0.98	10	18	48	10		QSO
181.0	07 25 20.22	14 43 46.6	18.92*	1.382	14.5	1.00	15	47	63	11		QSO
186.0	07 40 56.82	38 00 31.0	17.6	1.063	14.1	1.15	26	47	61	3	175, R	QSO
190.0	07 58 45.04	14 23 04.9	20.	1.197	15.0	0.93	22	18	171	90	19 ID, 169 ID	QSO
191.0	08 02 03.76	10 23 57.6	18.65*	1.956	13.0	0.98	21	47	99	71	64ABS	QSO
196.0	08 09 59.42	48 22 07.2	17.60*	0.871	68.2 C-	0.79	33	56	61	11		QSO
204.0	08 33 18.03	65 24 04.4	18.21	1.112	10.5	1.08	36	47	63	11		QSO
205.0	08 35 10.02	58 04 51.4	17.62	1.534	12.6	0.88	37	18	65	11	ABS	QSO
207.0	08 38 01.73	13 23 05.4	18.15	0.684	13.6 +	0.90	30	47	48	11		QSO
208.0	08 50 22.70	14 04 16.9	17.42	1.110	16.8 C-	0.96	33	59	66	90	63Z=1.112	QSO
212.0	08 55 55.62	14 21 24.2	19.06	1.049	15.1 C-	0.92	35	18	171	15	92ID, REDQ.	QSO
215.0	09 03 44.15	16 58 15.7	18.27	0.411	11.4	1.06	37	47	61	11		QSO
216.0	09 06 17.26	43 05 59.0	18.48*	0.67	20.2 +	0.84	43	53	171	90		QSO
220.2	09 27 29.93	36 14 37.0	19.	1.157	7.2 C-	0.61	47	18	21	90		QSO
245.0	10 40 06.02	12 19 15.1	17.25	1.029	14.4	0.78	56	53	54	90	87Z	QSO
249.1	11 00 27.42	77 15 08.7	15.72*	0.311	10.7	0.81	38	47	63	11	86Z, 12ID, 159S	QSO
254.0	11 11 53.35	40 53 42.0	17.98	0.734	19.9 C-	0.96	66	107	54	11		QSO
263.0	11 37 08.97	66 04 26.9	16.32	0.6563	15.2	0.82	50	47	86	11		QSO
268.4	12 06 42.16	43 56 2.0	18.42	1.400	10.3	0.80	71	18	65	11		QSO
270.1	12 18 04.00	33 59 50.0	18.61	1.519	13.6 C-	0.75	81	47	63	90	ABS	QSO
273.0	12 26 33.35	02 19 42.0	12.80*	0.158	62.8 CX	0.23	64	101	102	92	111SP	QSO
275.1	12 41 27.58	16 39 18.0	19.	0.557	18.3 C-	0.96	79	47	61	90		QSO
277.1	12 50 15.13	56 50 36.4	17.93	0.320	8.5 C-	0.64	60	47	63	11	159SED	QSO
280.1	12 58 14.09	40 25 16.2	19.44	1.659	9.2	0.93	77	47	61	9		QSO
286.0	13 28 49.65	30 45 58.5	17.25	0.849	25.0 C-	0.24	81	56	87	122	104ABS, 159SED	QSO
287.0	13 28 15.93	25 24 37.4	17.67	1.055	16.3 C-	0.42	81	59	54	112		QSO
288.1	13 40 29.94	60 36 48.4	18.12	0.961	9.0 C-	0.84	56	18	65	11	139ID	QSO
298.0	14 16 38.77	06 42 20.8	16.79	1.439	47.5 SC	0.99	61	107	61	112	ABS	QSO

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III. QUASI-STELLAR SOURCES

3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
309.1	14 58 56.64	71 52 11.2	16.78	0.904	22.7 C-	0.53	41	18	62	122	65,48Z,ABS159	QSO
323.1	15 45 31.11	21 01 32.5	16.69*	0.264	9.7 C-	0.65	49	18	65	11	111SP,CL,159S	QSO
334.0	16 18 07.40	17 43 30.5	16.41*	0.555	10.9	0.86	41	17	87	9	142ID,88Z,159	QSO
336.0	16 22 32.45	23 52 02.0	17.47	0.927	11.5 C-	0.73	42	47	61	11		QSO
343.0	16 34 01.12	62 51 42.4	20.61	0.988	12.4 C-	0.37	39	72	20	71		QSO
345.0	16 41 17.60	39 54 10.7	15.96*	0.594	10.8 CX	0.27	41	59	87	120	88Z	QSO
351.0	17 04 03.51	60 48 31.3	15.28	0.371	13.7	0.73	36	18	87	3	159SED	QSO
380.0	18 28 13.55	48 42 40.4	16.81*	0.691	59.4 +	0.71	24	59	87	71	88Z,159SED	QSO
418.0	20 37 07.3	51 08 35.	20.	1.686	13.1 +	0.44	6	8	171	71		QSO
432.0	21 20 25.53	16 51 46.4	17.96	1.805	11.0 C-	0.98	-23	18	63	10	142,37ID,159S	QSO
454.0	22 49 07.63	18 32 43.7	18.47*	1.757	11.6	0.90	-36	18	63	71	142,37ID	QSO
454.3	22 51 29.53	15 52 54.4	16.10*	0.860	13.0 CX	0.04	-39	23	48	120	65Z,159SED	QSO
455.0	22 52 34.53	12 57 33.5	19.7	0.5427	12.8 C-	0.71	-41	22	22	90		QSO

53 QUASI-STELLAR SOURCES IN THE 3C CATALOG

THE REVISED THIRD CAMBRIDGE CATALOG OF RADIO SOURCES

IV. UNCERTAIN IDENTIFICATIONS

3CR	RIGHT ASCENSION (1950)	DECLINATION (1950)	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
36.0	01 15 03.22	45 20 42.4	20.		8.2	0.85	-17	8		5		*QSO
91.0	03 34 02.96	50 35 55.7	18.		14.1 C-	0.72	-4	161		16	OBSCURED	*GAL
114.0	04 17 27.85	17 46 39.1	22.		6.5	0.89	-22	8		9	37ID	*GAL
134.0	05 01 17.73	38 02 06.1	20.		74.4	0.99	-2	161		161	OBSCRD. R=173	*GAL
173.0	06 58 56.67	38 01 46.1	21.3		8.7 C-	0.72	18	19		90		*QSO
194.0	08 06 37.88	42 36 56.0	20.	0.312	9.9 C-	0.79	32	19	156	11	BID,ABS	*GAL
222.0	09 33 55.	04 36 00.	23.		11.3 C-	1.17	38	150		71		*GAL
225.0A	09 39 25.17	14 05 35.9	R19.	0.134	7.6	0.93	44	8	177	125	ID? 161,162	*GAL
250.0	11 06 11.31	25 17 18.3	23.		8.8 C-	0.90	67	154		9	BEF, ID 169	*GAL
272.0	12 21 59.7	42 23 13.3	20.		8.0	0.87	74	18		9	BID	*GAL
300.1	14 25 56.60	-01 10 44.	R19.	0.308	14.1 C-	0.68	53	179		179	140=OLD ID.	*GAL
410.0	20 18 03.97	29 32 41.9	19.5		34.6 C-	0.56	-4	161		106	OBSCURED	*GAL
437.0	21 45 01.4	15 06 36.			14.6 C-	0.79	-28	158		10	B,37EF;IR DET	*GAL

13 IDENTIFICATIONS OF REVISED 3C SOURCES ARE AS YET UNCONFIRMED

THE REVISED THIRD CAMBRIDGE CATALOG OF RADIO SOURCES

V. UNIDENTIFIED SOURCES

3CR	RIGHT ASCENSION (1950)	DECLINATION (1950)	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
11.1	00 27 06.	63 24 00.			12.4	0.58	1			16	OBSCURED	
14.1	00 33 36.	59 30 00.			16.1 C-	0.80	-3			127	OBSCURED	
21.1	00 42 30.	67 48 00.			9.0		5			126	OBSCURED	
27.0	00 52 42.	68 13 00.			26.5 C-	0.61	6			106	OBSCURED	
33.2	01 06 54.	69 06 00.			5.5	0.90	7			126	OBSCURED	
69.0	02 34 18.5	58 58 51.	R		20.9 C-	0.90	-1			11	OBSCURD. R=173	
86.0	03 23 31.2	55 08 24.			29.0	0.64	-1			11		
107.0	04 09 55.	-01 01 00.			10.8 C-	1.02	-35			24	8*G, M=21	
124.0	04 39 24.	01 38 00.			10.3	1.18	-28			29	8EF	
125.0	04 42 50.	39 37 00.			14.1	0.95	-4			16	OBSCURED	
131.0	04 50 09.8	31 22 54.			14.6	0.79	-8			16	OBSCURED	
137.0	05 15 38.1	50 52 36.			12.5	0.93	8			106	OBSCURED	
139.2	05 21 19.1	28 11 00.			11.9	0.96	-4			106	OBSCRD. R=173	
141.0	05 23 26.3	32 47 00.			14.9 C-	0.88	-1			16	OBSCURED	
142.1	05 28 48.9	06 29 54.			19.4	0.86	-15			16	OBSCURED	
152.0	06 01 30.9	20 21 24.			12.4 C-	0.88	-1			29	8EF	
158.0	06 18 50.	14 31 00.			18.1	1.09	0			90	OBSCURED	
230.0	09 49 25.12	00 12 36.8	R		21.1	0.82	39			71	72ID=*(153)	
249.0	10 59 37.	-01 00 00.			16.9 C-	0.89	51			16	8EF	
255.0	11 17 02	-02 31 00.			12.5 C-	0.87	53			91	8EF	
257.0	11 20 43.	05 52 00.			9.7	0.84	60			121		
277.0	12 49 27.	50 50 40.	R21.		7.5	0.89	67			9	9*RSO, M=18, 19	
293.1	13 52 16.31	16 29 33.8	R		9.2	0.99	72			9		
294.0	14 04 33.99	34 25 37.1	R		10.3	1.07	72			10	8EF	
323.0	15 40 48.2	60 25 08.	R		8.4 C-	0.81	49			162		
326.1	15 53 57.2	20 12 58.	R		8.2	0.13	47			90	8EF	
389.0	18 43 41.	-03 23 00.			21.0		0				OBSCURED	
390.0	18 43 12.	09 49 00.			21.0	0.71	6			16	OBSCURED	
394.0	18 57 02.	12 56 00.			15.1 C-	0.78	4			90	OBSCURED	
399.1	19 14 00.	30 14 40.	R		13.5	0.78	9			24	R=173	
409.0	20 12 18.23	23 25 47.5	R		76.6 C-	0.78	-6			10	OBSCRD., X=176	
415.2	20 31 28.3	53 35 28.6	R		8.8	1.03	8			9		
428.0	21 06 45.2	49 21 54.			16.6	0.66	1			106	OBSCURED	
431.0	21 17 12.5	49 21 36.			24.2 C-	0.94	0			24	OBSCURED	
454.1	22 48 58.87	71 13 23.7			9.8 C-	0.82	11			11	37*CL, M=21.	
454.2	22 50 24.	64 48 00.			8.8 C-	0.61	5			106	OBSCURED	
468.1	23 48 36.	64 24 00.			30.0 C-	0.78	3			106	OBSCURED	
470.0	23 56 02.90	43 48 03.6	R		10.1 C-	0.77	-18			3	18ID=M*(153)	

38 SOURCES IN THE REVISED 3C CATALOG REMAIN UNIDENTIFIED

THE REVISED THIRD CAMBRIDGE CATALOG OF RADIO SOURCES

REFERENCES - ALPHABETICAL LISTING

107. ADGIE, R. L. 1964, NATURE 204, 1028.
90. ADGIE, R. L., CROWTHER, J. H. AND GENT, H. 1972, MNRAS 159, 233.
24. ADGIE, R. L. AND GENT, H. 1966, NATURE 209, 549.
22. ARP, H., BURBIDGE, E. M., MACKAY, C. D. AND STRITTMATTER, P. A. 1972, AP. J. 171, L41.
30. BAADE, W. AND MINKOWSKI, R. 1954, AP. J. 119, 206.
111. BALDWIN, J. A. 1975, AP. J. 201, L26.
20. BALDWIN, J. A., BURBIDGE, E. M., HAZARD, C., MURDOCH, H. S., ROBINSON, L. B. AND WAMPLER, E. J. 1973, AP. J. 185, 739.
137. BASH, F. N. 1968, AP. J. 152, 375.
1. BENNETT, A. S. 1962, MEM. RAS 68, 163.
105. BOKSENBERG, A., CARSWELL, R. F. AND OKE, J. B. 1976 AP. J. 206, L121
77. BOLTON, J. G. 1960, OBS. OWENS VALLEY RADIO OBS. NO. 5.
140. BOLTON, J. G. AND EKERS, J. 1966, AUS. J. PHYS. 19, 559.
80. BOLTON, J. G., STANLEY, G. J. AND SLEE, O. B. 1949, NATURE 164, 101.
15. BRANSON, N. J. B. A., ELSMORE, B., POOLEY, G. G. AND RYLE, M. 1972, MNRAS 156, 377.
112. BROSCHE, P., WADE, C. M., AND HJELLMING, R. 1973, AP. J. 183, 805.
104. BROWN, R. L. AND ROBERTS, M. S. 1973, AP. J. 184, L7.
130. BROWNE, I. 1976, PRIVATE COMMUNICATION.
88. BURBIDGE, E. M. 1965, AP. J. 142, 1674.
66. BURBIDGE, E. M. 1966, AP. J. 143, 612.
93. BURBIDGE, E. M. 1967, AP. J. 149, L51.
103. BURBIDGE, E. M. 1970, AP. J. 160, L33.
62. BURBIDGE, E. M. AND KINMAN, T. D. 1966, AP. J. 145, 654.
99. BURBIDGE, E. M., LYNDS, C. R. AND BURBIDGE, G. R. 1966, AP. J. 144, 447.
4. BURBIDGE, E. M. AND STRITTMATTER, P. A. 1972, AP. J. 172, L37.
44. BYSTEDT, J. E. V. 1975, ASTR. AND AP. 39, 155.
89. CHINCARINI, G. AND ROOD, H. J. 1971, AP. J. 168, 321.
114. CLARK, B. G. AND HOGG, D. E. 1966, AP. J. 145, 21.
120. COHEN, M. H. 1972, ASTROPHYS. LETT. 12, 81.
142. CLARKE, M. E., BOLTON, J. G. AND SHIMMINS, A. J. 1966, AUS. J. PHYS. 19, 375.
76. DEWHIRST, D. W. 1959, PARIS SYMPOSIUM ON RADIO ASTRONOMY, ED R. BRACEWELL (STANFORD - STANFORD UNIV. PRESS)
73. DEWHIRST, D. W. IN ELSMORE, B. 1959, PARIS SYMPOSIUM ON RADIO ASTRONOMY, ED R. BRACEWELL (STANFORD - STANFORD UNIV. PRESS)
110. DOUGLAS, J. N., BASH, F. N., GHIGO, F. D., MOSELEY, G. F. AND TORRENCE, G. W. 1973, A. J. 78, 1.
174. DREHER, J. W. & FEIGELSON, E. D. 1984, NATURE 308, 43
5. ELSMORE, B. AND MACKAY, C. D. 1969, MNRAS 146, 361.
176. FEIGELSON, E. D. AND BERG, C. J., 1983 APJ. 269, 400
113. FOMALONT, E. B. 1971, A. J. 76, 513.
16. FOMALONT, E. B. AND MOFFET, A. T. 1971, A. J. 76, 5.
126. FOMALONT, E. B., WYNDHAM, J. D. AND BARTLETT, J. F. 1967, A. J. 72, 445.
86. FORD, W. K. AND RUBIN, V. 1966, AP. J. 145, 357.
168. GUNN, J. E. 1980, PRIVATE COMMUNICATION
154. GUNN, J. E., HOESSEL, J. G., WESTPHAL, J. A., PERRYMAN, M. A. C., AND LONGAIR, M. S., 1981, MNRAS 194, 111
85. GREENSTEIN, J. L. 1962, AP. J. 135, 679.
57. GREENSTEIN, J. L. AND MATTHEWS, T. 1963, NATURE 197, 1041.
39. GRUEFF, G. AND VIGOTTI, M. 1975, ASTR. AND AP. SUPPL. 20, 57.
28. HARGRAVE, P. J. AND RYLE, M. 1974, MNRAS 166, 305.
160. HARGRAVE, P. J. AND MCELLIN, M. 1975, MNRAS 173, 37
115. HARRIS, A. 1972, MNRAS 158, 1.
118. HARRIS, A. 1973, MNRAS 163, 19P.
69. HARRIS, D. E. AND ROBERTS, J. A. 1960, PASP 72, 237.
92. HAZARD, C. 1965, IN QUASI-STELLAR SOURCES AND GRAVITATIONAL COLLAPSE, ED ROBINSON, ET. AL. (CHICAGO - UNIV OF CHICAGO PRES

REFERENCES - ALPHABETICAL LISTING

101. HAZARD, C., MACKEY, M. B. AND SHIMMINS, A. J. 1963, NATURE 197, 1037.
179. HECKMAN, T. 1985, PRIV. COMM.
58. HILL, J. M. AND LONGAIR, M. S. 1971, MNRAS 154, 125.
106. HOGBOM, J. A. AND CARLSSON, I. 1974, ASTR. AND AP. 34, 341.
31. HUMASON, M. L., MAYALL, N. U. AND SANDAGE, A. R. 1956, A. J. 61, 97.
121. HUNSTEAD, R. W. 1972, MNRAS 157, 367.
125. KAPAHI, V. K., JOSHI, M. N. AND KRISHNA, G. 1972, ASTROPHYS. LETT. 11, 155.
141. KELLERMAN, K. I., PAULINY-TOTH, I. I. K. AND WILLIAMS, P. J. S. 1969, AP. J. 157, 1.
72. KRISTIAN, J. AND SANDAGE, A. R. 1971, AP. J. 162, 391.
8. KRISTIAN, J., SANDAGE, A. R. AND KATEM, B. 1974, AP. J. 191, 43.
152. KRISTIAN, J., SANDAGE, A., AND KATEM, B., 1978, AP. J. 219, 803
129. KRISTIAN, J. AND WESTPHAL, J. A. 1976, PRIVATE COMMUNICATION.
131. KRONBERG, P. P. 1976, AP. J. 203, L47.
124. KRONBERG, P. P., PRITCHET, C. J. AND BERGH, S. VAN DEN 1972, AP. J. 173, L47.
169. LAING, R. A., LONGAIR, M. S., RILEY, J. M., KIBBLEWHITE, E. J., AND GUNN, J. E. 1978M. N. R. A. S. 183, 547.
151. LAING, R. A., RILEY, J. M., AND LONGAIR, M. S., 1983, MNRAS, 204, 151
165. LAING, R. A., AND OWEN, F. 1983 & 1984 PRIVATE COMMUNICATIONS
161. LEAHY, J. P. 1984, PRIVATE COMMUNICATION (VIA J. RILEY, 1984)
173. LEAHY, J. P. & WILLIAMS, A. G. 1984; M. N. R. A. S. (IN PRESS)
133. LELIEVRE, G. AND WLERICK, G. 1975, ASTR. AND AP. 42, 293.
158. LILLY, S. 1984, PRIVATE COMMUNICATION.
12. LONGAIR, M. S. 1965, MNRAS 129, 419.
37. LONGAIR, M. S. AND GUNN, J. E. 1975, MNRAS 170, 121.
100. LYNDS, C. R. 1961, AP. J. 134, 659.
48. LYNDS, C. R. 1967, AP. J. 147, 837.
70. LYNDS, C. R. 1971, AP. J. 168, L87.
134. LYNDS, C. R. IN SANDAGE, A. R. 1972, AP. J. 178, 25.
61. LYNDS, C. R., HILL, S. J., HEERE, K. AND STOCKTON, A. N. 1966, AP. J. 144, 1244.
87. LYNDS, C. R., STOCKTON, A. N. AND LIVINGSTON, W. 1965, AP. J. 142, 1667.
9. MACDONALD, G. H. KENDERDINE, S. AND NEVILLE, A. C. 1968, MNRAS 138, 259.
10. MACKAY, C. D. 1969, MNRAS 145, 31.
175. MACKLIN, J. T., 1983, MNRAS 203, 147.
68. MALTBY, P., MATTHEWS, T. A. AND MOFFET, A. T. 1963, AP. J. 137, 153.
138. MALTBY, P. AND MOFFET, A. T. 1962, AP. J. SUPPL. 7, 141.
25. MATTHEWS, T. A., MORGAN, W. W. AND SCHMIDT, M. 1964, AP. J. 140, 35.
56. MATTHEWS, T. A. AND SANDAGE, A. R. 1963, AP. J. 138, 30.
119. MENON, T. K. 1975, AP. J. 199, L61.
36. MILEY, G. K. 1973, ASTR. AND AP. 26, 413.
109. MILLER, J. S. 1975, AP. J. 200, 155.
33. MILLER, J. S., ROBINSON, L. B. AND WAMPLER, E. J. 1973, AP. J. 179, L83.
32. MILLS, B. Y. 1955, AUS. J. PHYS. 8, 368.
75. MILLS, B. Y. 1960, AUS. J. PHYS. 13, 550.
79. MILLS, B. Y., SLEE, O. B. AND HILL, E. R. 1958, AUS. J. PHYS. 8, 368.
74. MINKOWSKI, R. 1958, PASP 70, 143.
78. MINKOWSKI, R. 1960A, PROC. NAT. ACAD. SCI. 46, 13.
81. MINKOWSKI, R. 1960B. AP. J. 132, 908.
83. MINKOWSKI, R. 1961, A. J. 66, 558.
97. MINKOWSKI, R. IN MALTBY, MATTHEWS AND MOFFET 1963, AP. J. 137, 153.
91. MOSELEY, G. F., BROOKS, C. C. AND DOUGLAS, J. N. 1970, A. J. 775, 1015.
60. NORTHOVER, K. J. E. 1971, MNRAS 165, 369.

THE REVISED THIRD CAMBRIDGE CATALOG OF RADIO SOURCES

REFERENCES - ALPHABETICAL LISTING

159. OKE, J. B., NEUGEBAGER, G. AND BECKLIN, E. E. 1970, A. J. 159, 341
82. OSTERBROCK, D. E., KOSKI, A. T. AND PHILLIPS, M. M. 1975, AP. J. 197, L41.
108. OSTERBROCK, D. E. AND MILLER, J. S. 1975, AP. J. 197, 535.
27. PARKER, E. A., ELSMORE, B. AND SHAKESHAFT, J. R. 1966, NATURE 210, 22.
127. PAULINY-TOTH, I. I. K., WADE, C. M. AND HEESCHEN, D. S. 1966, AP. J. SUPPL. 15, 65.
95. PENSTON, M. V. 1971, AP. J. 170, 395.
96. PENSTON, M. J., PENSTON, M. V. AND SANDAGE, A. R. 1971, PASP 83, 783.
155. PERRYMAN, M. A. C., LILLY, S. J., LONGAIR, M. S., AND DOWNES, A. J. B., 1984, MNRAS, 209, 159
11. POOLEY, G. G. AND HENBEST, S. N. 1974, MNRAS 169, 477.
122. RYLE, M. AND ELSMORE, B. 1973, MNRAS 164, 223.
53. RYLE, M. AND SANDAGE, A. R. 1964, AP. J. 139, 419.
38. RYLE, M. AND WINDRAM, M. 1968, MNRAS 138, 1.
117. RILEY, J. M. 1972, MNRAS 157, 349.
116. RILEY, J. M. AND BRANSON, N. J. B. A. 1973, MNRAS 164, 271.
3. RILEY, J. M. AND POOLEY, G. G. 1975, MEM. RAS 80, 105.
170. RILEY, J. M., LONGAIR, M. S., AND GUNN, J. E., 1980, M. N. R. A. S. 192, 233
149. RILEY, J. M., EALES, S. A., AND BALDWIN, J. E., 1984, MNRAS, 209, 641
162. RILEY, J. M. 1984, PRIVATE COMMUNICATION
23. SANDAGE, A. R. 1966, AP. J. 144, 1234.
26. SANDAGE, A. R. 1966, AP. J. 145, 1.
94. SANDAGE, A. R. 1967, AP. J. 150, L145.
132. SANDAGE, A. R. 1973, AP. J. 180, 687.
47. SANDAGE, A. R., VERON, P. AND WYNDHAM, J. D. 1965, AP. J. 142, 1307.
59. SANDAGE, A. R. AND WYNDHAM, J. D. 1965, AP. J. 141, 328.
35. SARGENT, W. L. W. 1975, PRIVATE COMMUNICATION.
128. SCHILIZZI, R. T. AND MCADAM, W. B. 1975, MEM. RAS 79, 1.
98. SCHMIDT, M. 1962, AP. J. 136, 684.
102. SCHMIDT, M. 1963, NATURE 197, 1040.
67. SCHMIDT, M. 1965, AP. J. 141, 1.
54. SCHMIDT, M. 1965, AP. J. 141, 1295.
63. SCHMIDT, M. 1966, AP. J. 144, 443.
65. SCHMIDT, M. 1968, AP. J. 151, 393.
14. SCHMIDT, M. 1972, YEARBOOK OF THE CARNEGIE INSTITUTION OF WASHINGTON.
55. SCHMIDT, M. AND MATTHEWS, T. A. 1964, AP. J. 139, 781.
146. SHAFFER AND KELLERMANN PRIVATE COMM. 1977
135. SMITH, J. W. 1971, NATURE 232, 150.
6. SMITH, H. E., BURBIDGE, E. M. AND SPINRAD, H. 1976, AP. J. 210, 627.
46. SMITH, H. E., SPINRAD, H. AND HUNSTEAD, R. 1976, AP. J. 206 345.
147. SMITH, H. E., JUNKKARINEN, V., SPINRAD, H., GRUEFF, G., AND VIGOTTI, M. 1979, AP. J. 231, 307
171. SMITH, H. E. AND SPINRAD, H. 1980, AP. J. 236, 419.
156. SMITH, H. E., AND SPINRAD, H., 1980, PASP 92, 553
45. SPINRAD, H. AND SMITH, H. E. 1973, AP. J. 179, L71.
52. SPINRAD, H. 1975, AP. J. 199, L1.
40. SPINRAD, H., SMITH, H. E., HUNSTEAD, R. AND RYLE, M. 1975, AP. J. 198, 7.
51. SPINRAD, H. 1975, AP. J. 199, L3.
42. SPINRAD, H. AND LIEBERT, J. 1976, AP. J. 208, 292.
50. SPINRAD, H., LIEBERT, J., SMITH, H. E. AND HUNSTEAD, R. 1976, AP. J. 206, L79.
49. SPINRAD, H. AND SMITH, H. E. 1976, AP. J. 206, 355.
153. SPINRAD, H., SMITH, H. E. AND BURBIDGE, E. M. 1976 UNPUBLISHED.
143. SPINRAD H., 1977 UNPUBL.

REFERENCES – ALPHABETICAL LISTING

163. SPINRAD, H. 1978, AP. J. 220, L135
167. SPINRAD, H., KRON, R. G., AND HUNSTEAD, R. 1979, AP. J. SUPPL. 41, 701.
145. SPINRAD, WESTPHAL, KRISTIAN, AND SANDAGE 1977, AP. J. 216, L87
157. SPINRAD, H., STAUFFER, J., AND BUTCHER, H., 1981, AP. J. 244, 382
164. SPINRAD, H. 1982, P. A. S. P. 94, 397
150. SPINRAD, H., AND DJORGOVSKI, S. 1985, UNPUBLISHED.
148. SPINRAD, H. AND DJORGOVSKI, S. 1984, AP. J. 285, L49.
166. SPINRAD, H. AND DJORGOVSKI, S. 1984, AP. J. 208, L9.
177. SPINRAD, H. (1985) UNPUBLISHED
180. SPINRAD, H., FILIPPENKO, A., WYCKOFF, S., STOCKE, J., WAGNER, M., AND LAWRIE, D. 1985, IN PREPARATION.
64. STOCKTON, A. N. AND LYNDS, C. R. 1966, AP. J. 144, 451.
172. VAN BRUEGEL, W. 1984, PRIVATE COMMUNICATION.
178. VAN BRUEGEL, W. 1985, PRIVATE COMMUNICATION.
7. VERON, M. P. AND VERON, P. 1974, ASTR. AND AP. SUPPL. 18, 309.
41. VERON, M. P., VERON, P., ADGIE, R. L. AND GENT, H. 1976 ASTR. AND AP. 47, 401.
13. VERON, P. 1966, AP. J. 144, 861.
34. VERON, P. AND VERON, M. P. 1973, ASTROPHYS. LETTERS 14, 237.
71. WADE, C. M. 1970, AP. J. 162, 381.
136. WADE, C. M., CLARK, B. G., AND HOGG, D. E. 1965, AP. J. 142, 406.
29. WADE, C. M. AND MILEY, G. K. 1971, A. J. 76, 101.
123. WILLS, B. J. 1975, AP. J. 202, L59.
21. WILLS, D. AND LYNDS, C. R. 1972, ASTROPHYS. LETTERS 11, 189.
139. WILLS, D. AND PARKER, E. A. 1966, MNRAS 131, 503.
43. WILLS, D. AND WILLS, B. J. 1974, AP. J. 190, L97.
84. WILLIAMS, P. J. S., DEWHIRST, D. W. AND LESLIE, P. R. R. 1961, OBSERVATORY 81, 64.
2. WILLIS, A. G. 1976, PRIVATE COMMUNICATION.
19. WLERICK, G., LELIEVRE, G. AND VERON, P. 1971, ASTR. AND AP. 11, 142.
17. WYNDHAM, J. D. 1965, A. J. 70, 384.
18. WYNDHAM, J. D. 1966, AP. J. 144, 459.
999. THIS PAPER.
0.

THE REVISED THIRD CAMBRIDGE CATALOG OF RADIO SOURCES

REFERENCES - LISTING BY REFERENCE NUMBER

0.
1. BENNETT, A. S. 1962, MEM. RAS 68, 163.
2. WILLIS, A. G. 1976, PRIVATE COMMUNICATION.
3. RILEY, J. M. AND POOLEY, G. G. 1975, MEM. RAS 80, 105.
4. BURBIDGE, E. M. AND STRITTMATTER, P. A. 1972, AP. J. 172, L37.
5. ELSMORE, B. AND MACKAY, C. D. 1969, MNRAS 146, 361.
6. SMITH, H. E., BURBIDGE, E. M. AND SPINRAD, H. 1976, AP. J. 210, 627.
7. VERON, M. P. AND VERON, P. 1974, ASTR. AND AP. SUPPL. 18, 309.
8. KRISTIAN, J., SANDAGE, A. R. AND KATEM, B. 1974, AP. J. 191, 43.
9. MACDONALD, G. H. KENDERDINE, S. AND NEVILLE, A. C. 1968, MNRAS 138, 259.
10. MACKAY, C. D. 1969, MNRAS 145, 31.
11. POOLEY, G. G. AND HENBEST, S. N. 1974, MNRAS 169, 477.
12. LONGAIR, M. S. 1965, MNRAS 129, 419.
13. VERON, P. 1966, AP. J. 144, 861.
14. SCHMIDT, M. 1972, YEARBOOK OF THE CARNEGIE INSTITUTION OF WASHINGTON.
15. BRANSON, N. J. B. A., ELSMORE, B., POOLEY, G. G. AND RYLE, M. 1972, MNRAS 156, 377.
16. FOMALONT, E. B. AND MOFFET, A. T. 1971, A. J. 76, 5.
17. WYNDHAM, J. D. 1965, A. J. 70, 384.
18. WYNDHAM, J. D. 1966, AP. J. 144, 459.
19. WLERICK, G., LELIEVRE, G. AND VERON, P. 1971, ASTR. AND AP. 11, 142.
20. BALDWIN, J. A., BURBIDGE, E. M., HAZARD, C., MURDOCH, H. S., ROBINSON, L. B. AND WAMPLER, E. J. 1973, AP. J. 185, 739.
21. WILLS, D. AND LYNDS, C. R. 1972, ASTROPHYS. LETTERS 11, 189.
22. ARP, H., BURBIDGE, E. M., MACKAY, C. D. AND STRITTMATTER, P. A. 1972, AP. J. 171, L41.
23. SANDAGE, A. R. 1966, AP. J. 144, 1234.
24. ADGIE, R. L. AND GENT, H. 1966, NATURE 209, 549.
25. MATTHEWS, T. A., MORGAN, W. W. AND SCHMIDT, M. 1964, AP. J. 140, 35.
26. SANDAGE, A. R. 1966, AP. J. 145, 1.
27. PARKER, E. A., ELSMORE, B. AND SHAKESHAFT, J. R. 1966, NATURE 210, 22.
28. HARGRAVE, P. J. AND RYLE, M. 1974, MNRAS 166, 305.
29. WADE, C. M. AND MILEY, G. K. 1971, A. J. 76, 101.
30. BAADE, W. AND MINKOWSKI, R. 1954, AP. J. 119, 206.
31. HUMASON, M. L., MAYALL, N. U. AND SANDAGE, A. R. 1956, A. J. 61, 97.
32. MILLS, B. Y. 1955, AUS. J. PHYS. 8, 368.
33. MILLER, J. S., ROBINSON, L. B. AND WAMPLER, E. J. 1973, AP. J. 179, L83.
34. VERON, P. AND VERON, M. P. 1973, ASTROPHYS. LETTERS 14, 237.
35. SARGENT, W. L. W. 1975, PRIVATE COMMUNICATION.
36. MILEY, G. K. 1973, ASTR. AND AP. 26, 413.
37. LONGAIR, M. S. AND GUNN, J. E. 1975, MNRAS 170, 121.
38. RYLE, M. AND WINDRAM, M. 1968, MNRAS 138, 1.
39. GRUEFF, G. AND VIGOTTI, M. 1975, ASTR. AND AP. SUPPL. 20, 57.
40. SPINRAD, H., SMITH, H. E., HUNSTEAD, R. AND RYLE, M. 1975, AP. J. 198, 7.
41. VERON, M. P., VERON, P., ADGIE, R. L. AND GENT, H. 1976 ASTR. AND AP. 47, 401.
42. SPINRAD, H. AND LIEBERT, J. 1976, AP. J. 208, 292.
43. WILLS, D. AND WILLS, B. J. 1974, AP. J. 190, L97.
44. BYSTEDT, J. E. V. 1975, ASTR. AND AP. 39, 155.
45. SPINRAD, H. AND SMITH, H. E. 1973, AP. J. 179, L71.
46. SMITH, H. E., SPINRAD, H. AND HUNSTEAD, R. 1976, AP. J. 206 345.
47. SANDAGE, A. R., VERON, P. AND WYNDHAM, J. D. 1965, AP. J. 142, 1307.
48. LYNDS, C. R. 1967, AP. J. 147, 837.
49. SPINRAD, H. AND SMITH, H. E. 1976, AP. J. 206, 355.

REFERENCES - LISTING BY REFERENCE NUMBER

50. SPINRAD, H., LIEBERT, J., SMITH, H. E. AND HUNSTEAD, R. 1976, AP. J. 206, L79.
51. SPINRAD, H. 1975, AP. J. 199, L3.
52. SPINRAD, H. 1975, AP. J. 199, L1.
53. RYLE, M. AND SANDAGE, A. R. 1964, AP. J. 139, 419.
54. SCHMIDT, M. 1965, AP. J. 141, 1295.
55. SCHMIDT, M. AND MATTHEWS, T. A. 1964, AP. J. 139, 781.
56. MATTHEWS, T. A. AND SANDAGE, A. R. 1963, AP. J. 138, 30.
57. GREENSTEIN, J. L. AND MATTHEWS, T. 1963, NATURE 197, 1041.
58. HILL, J. M. AND LONGAIR, M. S. 1971, MNRAS 154, 125.
59. SANDAGE, A. R. AND WYNDHAM, J. D. 1965, AP. J. 141, 328.
60. NORTHOVER, K. J. E. 1971, MNRAS 165, 369.
61. LYNDS, C. R., HILL, S. J., HEERE, K. AND STOCKTON, A. N. 1966, AP. J. 144, 1244.
62. BURBIDGE, E. M. AND KINMAN, T. D. 1966, AP. J. 145, 654.
63. SCHMIDT, M. 1966, AP. J. 144, 443.
64. STOCKTON, A. N. AND LYNDS, C. R. 1966, AP. J. 144, 451.
65. SCHMIDT, M. 1968, AP. J. 151, 393.
66. BURBIDGE, E. M. 1966, AP. J. 143, 612.
67. SCHMIDT, M. 1965, AP. J. 141, 1.
68. MALTBY, P., MATTHEWS, T. A. AND MOFFET, A. T. 1963, AP. J. 137, 153.
69. HARRIS, D. E. AND ROBERTS, J. A. 1960, PASP 72, 237.
70. LYNDS, C. R. 1971, AP. J. 168, L87.
71. WADE, C. M. 1970, AP. J. 162, 381.
72. KRISTIAN, J. AND SANDAGE, A. R. 1971, AP. J. 162, 391.
73. DEWHIRST, D. W. IN ELSMORE, B. 1959, PARIS SYMPOSIUM ON RADIO ASTRONOMY, ED R. BRACEWELL (STANFORD - STANFORD UNIV. PRESS)
74. MINKOWSKI, R. 1958, PASP 70, 143.
75. MILLS, B. Y. 1960, AUS. J. PHYS. 13, 550.
76. DEWHIRST, D. W. 1959, PARIS SYMPOSIUM ON RADIO ASTRONOMY, ED R. BRACEWELL (STANFORD - STANFORD UNIV. PRESS)
77. BOLTON, J. G. 1960, OBS. OWENS VALLEY RADIO OBS. NO. 5.
78. MINKOWSKI, R. 1960A, PROC. NAT. ACAD. SCI. 46, 13.
79. MILLS, B. Y., SLEE, O. B. AND HILL, E. R. 1958, AUS. J. PHYS. 8, 368.
80. BOLTON, J. G., STANLEY, G. J. AND SLEE, O. B. 1949, NATURE 164, 101.
81. MINKOWSKI, R. 1960B. AP. J. 132, 908.
82. OSTERBROCK, D. E., KOSKI, A. T. AND PHILLIPS, M. M. 1975, AP. J. 197, L41.
83. MINKOWSKI, R. 1961, A. J. 66, 558.
84. WILLIAMS, P. J. S., DEWHIRST, D. W. AND LESLIE, P. R. R. 1961, OBSERVATORY 81, 64.
85. GREENSTEIN, J. L. 1962, AP. J. 135, 679.
86. FORD, W. K. AND RUBIN, V. 1966, AP. J. 145, 357.
87. LYNDS, C. R., STOCKTON, A. N. AND LIVINGSTON, W. 1965, AP. J. 142, 1667.
88. BURBIDGE, E. M. 1965, AP. J. 142, 1674.
89. CHINCARINI, G. AND ROOD, H. J. 1971, AP. J. 168, 321.
90. ADGIE, R. L., CROWTHER, J. H. AND GENT, H. 1972, MNRAS 159, 233.
91. MOSELEY, G. F., BROOKS, C. C. AND DOUGLAS, J. N. 1970, A. J. 775, 1015.
92. HAZARD, C. 1965, IN QUASI-STELLAR SOURCES AND GRAVITATIONAL COLLAPSE, ED ROBINSON, ET. AL. (CHICAGO - UNIV OF CHICAGO PRES
93. BURBIDGE, E. M. 1967, AP. J. 149, L51.
94. SANDAGE, A. R. 1967, AP. J. 150, L145.
95. PENSTON, M. V. 1971, AP. J. 170, 395.
96. PENSTON, M. J., PENSTON, M. V. AND SANDAGE, A. R. 1971, PASP 83, 783.
97. MINKOWSKI, R. IN MALTBY, MATTHEWS AND MOFFET 1963, AP. J. 137, 153.
98. SCHMIDT, M. 1962, AP. J. 136, 684.
99. BURBIDGE, E. M., LYNDS, C. R. AND BURBIDGE, G. R. 1966, AP. J. 144, 447.

THE REVISED THIRD CAMBRIDGE CATALOG OF RADIO SOURCES

REFERENCES - LISTING BY REFERENCE NUMBER

100. LYNDS, C. R. 1961, AP. J. 134, 659.
101. HAZARD, C., MACKEY, M. B. AND SHIMMINS, A. J. 1963, NATURE 197, 1037.
102. SCHMIDT, M. 1963, NATURE 197, 1040.
103. BURBIDGE, E. M. 1970, AP. J. 160, L33.
104. BROWN, R. L. AND ROBERTS, M. S. 1973, AP. J. 184, L7.
105. BOKSENBERG, A., CARSWELL, R. F. AND OKE, J. B. 1976 AP. J. 206, L121
106. HOGBOM, J. A. AND CARLSSON, I. 1974, ASTR. AND AP. 34, 341.
107. ADGIE, R. L. 1964, NATURE 204, 1028.
108. OSTERBROCK, D. E. AND MILLER, J. S. 1975, AP. J. 197, 535.
109. MILLER, J. S. 1975, AP. J. 200, 155.
110. DOUGLAS, J. N., BASH, F. N., GHIGO, F. D., MOSELEY, G. F. AND TORRENCE, G. W. 1973, A. J. 78, 1.
111. BALDWIN, J. A. 1975, AP. J. 201, L26.
112. BROSCHE, P., WADE, C. M., AND HJELLMING, R. 1973, AP. J. 183, 805.
113. FOMALONT, E. B. 1971, A. J. 76, 513.
114. CLARK, B. G. AND HOGG, D. E. 1966, AP. J. 145, 21.
115. HARRIS, A. 1972, MNRAS 158, 1.
116. RILEY, J. M. AND BRANSON, N. J. B. A. 1973, MNRAS 164, 271.
117. RILEY, J. M. 1972, MNRAS 157, 349.
118. HARRIS, A. 1973, MNRAS 163, 19P.
119. MENON, T. K. 1975, AP. J. 199, L61.
120. COHEN, M. H. 1972, ASTROPHYS. LETT. 12, 81.
121. HUNSTEAD, R. W. 1972, MNRAS 157, 367.
122. RYLE, M. AND ELSMORE, B. 1973, MNRAS 164, 223.
123. WILLS, B. J. 1975, AP. J. 202, L59.
124. KRONBERG, P. P., PRITCHET, C. J. AND BERGH, S. VAN DEN 1972, AP. J. 173, L47.
125. KAPAHI, V. K., JOSHI, M. N. AND KRISHNA, G. 1972, ASTROPHYS. LETT. 11, 155.
126. FOMALONT, E. B., WYNDHAM, J. D. AND BARTLETT, J. F. 1967, A. J. 72, 445.
127. PAULINY-TOTH, I. I. K., WADE, C. M. AND HEESCHEN, D. S. 1966, AP. J. SUPPL. 15, 65.
128. SCHILIZZI, R. T. AND MCADAM, W. B. 1975, MEM. RAS 79, 1.
129. KRISTIAN, J. AND WESTPHAL, J. A. 1976, PRIVATE COMMUNICATION.
130. BROWNE, I. 1976, PRIVATE COMMUNICATION.
131. KRONBERG, P. P. 1976, AP. J. 203, L47.
132. SANDAGE, A. R. 1973, AP. J. 180, 687.
133. LELIEVRE, G. AND WLERICK, G. 1975, ASTR. AND AP. 42, 293.
134. LYNDS, C. R. IN SANDAGE, A. R. 1972, AP. J. 178, 25.
135. SMITH, J. W. 1971, NATURE 232, 150.
136. WADE, C. M., CLARK, B. G., AND HOGG, D. E. 1965, AP. J. 142, 406.
137. BASH, F. N. 1968, AP. J. 152, 375.
138. MALTBY, P. AND MOFFET, A. T. 1962, AP. J. SUPPL. 7, 141.
139. WILLS, D. AND PARKER, E. A. 1966, MNRAS 131, 503.
140. BOLTON, J. G. AND EKERS, J. 1966, AUS. J. PHYS. 19, 559.
141. KELLERMAN, K. I., PAULINY-TOTH, I. I. K. AND WILLIAMS, P. J. S. 1969, AP. J. 157, 1.
142. CLARKE, M. E., BOLTON, J. G. AND SHIMMINS, A. J. 1966, AUS. J. PHYS. 19, 375.
143. SPINRAD H., 1977 UNPUBL.
145. SPINRAD, WESTPHAL, KRISTIAN, AND SANDAGE 1977, AP. J. 216, L87
146. SHAFFER AND KELLERMANN PRIVATE COMM. 1977
147. SMITH, H. E., JUNKKARINEN, V., SPINRAD, H., GRUEFF, G., AND VIGOTTI, M. 1979, AP. J. 231, 307
148. SPINRAD, H. AND DJORGOVSKI, S. 1984, AP. J. 285, L49.
149. RILEY, J. M., EALES, S. A., AND BALDWIN, J. E., 1984, MNRAS, 209, 641
150. SPINRAD, H., AND DJORGOVSKI, S. 1985, UNPUBLISHED.

THE REVISED THIRD CAMBRIDGE CATALOG OF RADIO SOURCES

REFERENCES - LISTING BY REFERENCE NUMBER

151. LAING, R. A., RILEY, J. M., AND LONGAIR, M. S., 1983, MNRAS, 204, 151
152. KRISTIAN, J., SANDAGE, A., AND KATEM, B., 1978, AP. J. 219, 803
153. SPINRAD, H., SMITH, H. E. AND BURBIDGE, E. M. 1976 UNPUBLISHED.
154. GUNN, J. E., HOESSEL, J. G., WESTPHAL, J. A., PERRYMAN, M. A. C., AND LONGAIR, M. S., 1981, MNRAS 194, 111
155. PERRYMAN, M. A. C., LILLY, S. J., LONGAIR, M. S., AND DOWNES, A. J. B., 1984, MNRAS, 209, 159
156. SMITH, H. E., AND SPINRAD, H., 1980, PASP 92, 553
157. SPINRAD, H., STAUFFER, J., AND BUTCHER, H., 1981, AP. J. 244, 382
158. LILLY, S. 1984, PRIVATE COMMUNICATION.
159. OKE, J. B., NEUGEBAGER, G. AND BECKLIN, E. E. 1970, A. J. 159, 341
160. HARGRAVE, P. J. AND MCELLIN, M. 1975, MNRAS 173, 37
161. LEAHY, J. P. 1984, PRIVATE COMMUNICATION (VIA J. RILEY, 1984)
162. RILEY, J. M. 1984, PRIVATE COMMUNICATION
163. SPINRAD, H. 1978, AP. J. 220, L135
164. SPINRAD, H. 1982, P. A. S. P. 94, 397
165. LAING, R. A., AND OWEN, F. 1983 & 1984 PRIVATE COMMUNICATIONS
166. SPINRAD, H. AND DJORGOVSKI, S. 1984, AP. J. 208, L9.
167. SPINRAD, H., KRON, R. G., AND HUNSTEAD, R. 1979, AP. J. SUPPL. 41, 701.
168. GUNN, J. E. 1980, PRIVATE COMMUNICATION
169. LAING, R. A., LONGAIR, M. S., RILEY, J. M., KIBBLEWHITE, E. J., AND GUNN, J. E. 1978M. N. R. A. S. 183, 547.
170. RILEY, J. M., LONGAIR, M. S., AND GUNN, J. E., 1980, M. N. R. A. S. 192, 233
171. SMITH, H. E. AND SPINRAD, H. 1980, AP. J. 236, 419.
172. VAN BRUEGEL, W. 1984, PRIVATE COMMUNICATION.
173. LEAHY, J. P. & WILLIAMS, A. G. 1984; M. N. R. A. S. (IN PRESS)
174. DREHER, J. W. & FEIGELSON, E. D. 1984, NATURE 308, 43
175. MACKLIN, J. T., 1983, MNRAS 203, 147.
176. FEIGELSON, E. D. AND BERG, C. J., 1983 APJ. 269, 400
177. SPINRAD, H. (1985) UNPUBLISHED
178. VAN BRUEGEL, W. 1985, PRIVATE COMMUNICATION.
179. HECKMAN, T. 1985, PRIV. COMM.
180. SPINRAD, H., FILIPPENKO, A., WYCKOFF, S., STOCKE, J., WAGNER, M., AND LAWRIE, D. 1985, IN PREPARATION.
999. THIS PAPER.